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FM 1-104

**Tactics, Techniques, and Procedures for
Forward Arming and Refueling Points**

HEADQUARTERS, DEPARTMENT OF THE ARMY

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DEPARTMENT OF THE ARMY
WASHINGTON, DC, 12 SEPTEMBER 1994

**TACTICS, TECHNIQUES, AND PROCEDURES FOR FORWARD ARMING
AND REFUELING POINTS**

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*This publication supersedes FM 1-104, 31 July 1985.

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PREFACE

This manual describes forward arming and refueling point operations. It provides aviation commanders, staff elements, and Class III and V personnel with a comprehensive view of the purpose, organization, and operation of the FARP. It also describes planning considerations for setup of the FARP as well as transportation planning for Class III and V products.

This manual is an unclassified information source that personnel can use when they plan for or operate a FARP. It is based on Army doctrine as described in FMs 1-100, 1-111, 71-100, and 100-5.

This field manual primarily applies to aviation unit commanders, their staffs, and Class III and V personnel operating a FARP. It applies to aviation units in L-series TOE that are operating on the battlefield. Although this manual refers to attack helicopters because they make the greatest use of the FARP, the principles contained herein apply to all aviation units that may be involved in forward arming and refueling missions.

The proponent of this publication is HQ TRADOC. Send comments and recommendations on DA Form 2028 (Recommended Changes to Publications and Blank Forms) directly to Commander, US Army Aviation Center, ATTN: ATZQ-BDE-O, Fort Rucker, AL 36362-5000.

This publication implements the following international agreements:

QSTAG 691 (Edition Two) and AIR STD 44/31C	Helicopter Tactical Refueling
QSTAG 703 (Edition One)	Tactical Approach and Departure at Field Sites
STANAG 2946 (Edition One)	Forward Area Refueling Equipment
STANAG 2999 (Edition One)	Use of Helicopters in Land Operations
STANAG 3117 (Edition Five) and AIR STD 44/42A	Aircraft Marshalling Signals

Unless this publication states otherwise, masculine nouns and pronouns do not refer exclusively to men.

This publication has been reviewed for operations security considerations.



CHAPTER 1

INTRODUCTION

The FARP is vital to the success of the aviation combat mission. Attack, air assault, and support aviation units all depend on the FARP to provide fuel and ammunition where and when they are needed. This chapter defines the FARP and discusses its purpose. It also discusses planning factors, personnel composition, and the threat.

1-1. DEFINITION

A FARP is a temporary arming and refueling facility that is organized, equipped, and deployed by an aviation unit commander to support tactical operations. The FARP is usually located closer to the area of operations than the combat service support area of an aviation unit. The FARP provides fuel and ammunition for aviation units in combat. The fluid situation of the battlefield demands that the FARP be austere, transitory, and able to support specific mission objectives. The FARP should be flexible enough to self-deploy or to be aurally inserted, and it must meet the Class III/V needs of mission aircraft.

1-2. PURPOSE

The FARP increases the time on station for the commander by reducing the turnaround time associated with refueling and rearming. FARPs thereby give the commander more time to apply continuous pressure on the enemy. They are usually employed when the turnaround time at the unit trains is too long or when time on station must be optimized. FARPs also are employed in support of deep attacks or special operations when the distance covered exceeds the normal range of the aircraft. Additionally, FARPs are employed during rapid advances when field trains are unable to keep pace.

1-3. ORGANIZATION

Aviation units organized under the L-series TOE have austere personnel and equipment assets. Task organizing Class III/V assets for FARP operations may be difficult at the unit level.

1-4. PERSONNEL

a. Personnel allocations for the FARP include three MOSs: 77F, 55B, and 68J. The petroleum specialist, MOS 77F, transports Class III and services aircraft with fuel. The ammunition specialist, MOS 55B, receives and transports Class V munitions from the supply point to the arming point. The ammunition specialist has no aircraft-specific duties; he is responsible for unpacking ammunition. The aircraft armament/missile system repairer, MOS 68J, repairs aircraft fire control systems. He also loads and arms attack aircraft. In addition to these three MOSs, the commander should position medical personnel, battle damage assessment teams/maintenance personnel, Stinger teams, or other personnel as needed.

b. In the heavy division/corps aviation attack battalions, the 77F and 55B are assigned to the Class III/V platoon of the battalion HHC. In light divisions, these personnel are assigned to the brigade HHC. In assault and medium lift companies, 77Fs are assigned to the company or to the battalion HHC if a battalion has been formed. The 68J is assigned to the aircraft component repair section of the AVUM company. The commander should be aware that separation from units of assignment can cause command and control problems.

c. The increased tempo of operations and/or density of traffic may require ATS assets. In such cases, the commander or his representative may request a tactical aviation control team from the ATS battalion.

1-5. PLANNING FACTORS

a. Three basic principles must be satisfied when planning a FARP to support aviation units. They are--

- The FARP must meet unit mission requirements.
- The FARP must provide support throughout the battlefield under all conditions.
- The FARP must avoid threat observation and engagement.

b. The intensity of the battle will affect FARP activities. For example, a higher intensity may create a greater need for Class V items than for Class III items. Therefore, aircraft may return to the FARP more often to rearm than to refuel. However, in a reconnaissance scenario wherein aircraft are "hunting" for

targets, the need for fuel may be greater than the need for ammunition.

c. A FARP should be set up if the distance between the battle positions and the logistics trains exceeds 30 kilometers. Thirty kilometers is a trade-off distance. A greater distance may leave the commander with inadequate fuel, ammunition, and time on station to complete the mission. The adequacy of roads, availability of higher-echelon ground and aviation support, and distance to Class III/V distribution points affect how well the FARP can be supported and sustained.

d. Survivability of the FARP on the battlefield will depend on high mobility and the ability to displace rapidly. Careful site selection, effective camouflage, and minimum personnel and equipment will result in an austere, yet a mission-capable FARP.

1-6. THREAT

An effective way to neutralize the effectiveness of aviation forces is to prevent aircraft from rearming and refueling. Therefore, the FARP will be a high-priority target for the enemy. Class III/V stocks in the area of operations will likely be subject to NBC, ground, tactical air, air assault, and artillery attacks. FARP operations may even be harassed by local sympathizers and insurgents. FMs 100-2-1, 100-2-2, and 100-2-3 contain information about specific tactics, doctrine, and capabilities of enemy forces.



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CHAPTER 2

COMMAND, CONTROL, AND COMMUNICATIONS

The most difficult aspect of FARP operations is how to command, control, and communicate with other elements in the aviation unit without compromising the FARP. This chapter discusses the C³ responsibilities of the commander and his staff relative to the FARP. It also includes modes and methods for aircraft control into, within, and out of the FARP.

2-1. COMMAND AND CONTROL

a. **Commander.** The commander is responsible for the overall success of the FARP. Based on the factors of METT-T, the commander decides how his FARP assets will be used to support his operational intent.

b. **Executive Officer.** The executive officer is the principal assistant to the commander. He must be prepared to assume command at any time. The executive officer supervises the S3 and S4 as they coordinate the logistics support for the unit.

c. **S3.** The S3 formulates the commander's plan, which includes the FARP, to accomplish the mission. The S3 consults with the S4 and the HHC commander to ensure that the plan can be supported logistically.

d. **S4.** The S4 calculates the fuel and ammunition required for the mission and plans the distribution of these supplies. He then coordinates these requirements with higher headquarters.

e. **Class III/V Platoon Leader.** The Class III/V platoon leader is responsible for accomplishing the FARP mission. He also must keep the S4 informed about the amounts of fuel and ammunition on hand.

2-2. AIRCRAFT CONTROL

The control of aircraft within the FARP is critical to safety and overall efficiency of the operation. The proximity of the FARP to the battlefield restricts the use of electronic methods for positive aircraft control. The most effective means of control will be a thorough briefing and a well-written SOP that outlines the FARP procedures to be followed by both aircrews and FARP personnel. Additionally, offset, low-output nondirectional radio

beacons may be a low risk method for locating FARPs. Also, various signaling methods may be used to gain procedural aircraft control.

a. Electronic Signals.

(1) The use of air traffic services in a FARP is METT-T dependent. Under some circumstances, such as during situations other than war, ATS units can provide the aviation commander with a measure of safety and synchronization. A tactical aviation control team can manage the flow of aircraft for a faster, safer, and more efficient operation.

(2) A tactical aviation control team has three soldiers equipped with a lightweight man-transportable tower and a navigational aid. This equipment can be set up in 20 minutes or less. It provides a low-to-medium, short-to-medium range NDB and secure-voice VHF AM/FM and UHF AM.

b. Visual Signals. Visual signals include hand and arm signals, smoke, signal flags, SAM cards, and light signals. Ground guides will normally control the movement of aircraft within the FARP. Because ground guides may direct allied aircraft, they must use standard hand and arm signals. These signals are shown in Appendix A.

(1) Although smoke is not the preferred visual signal, it has several advantages. For instance, it can indicate wind direction. Different colors can indicate the current situation of the FARP or the availability of Class III/V products. Smoke also has some disadvantages. For example, it can only be used during the day and it can compromise the location of the FARP. Smoke is not a preferred visual signal.

(2) Flashlights and light wands are other types of visual signals. The flashlight can be used with color-coded disks to relay information. A separate colored disk, which is easily seen at night, can indicate the FARP situation or supply availability. During the day, signal flags of different colors can serve the same purpose. Flashlights can be used with hand and arm signals. However, the use of a light to relay information violates current light discipline policy. Standard light signals are used by NATO. Light wands can be used for hand and arm signals as well as to mark departure, landing, and arming and refueling points.

(3) Chemical lights come in a variety of colors to include infrared, which can be seen only through night vision devices. They can be used in the same manner as flashlights and light wands. An effective technique for lighting the landing

area using chemical lights is to dig a shallow trench in the shape of the landing area and place chemical or beanbag lights in the trench. The landing area can be seen only at a certain angle from the air; on the ground, it is difficult to see.

(4) Lights should not be kept on in the FARP. They should be turned on or put out just before aircraft arrive and turned off or removed when aircraft leave. This procedure helps avoid enemy detection.

c. Arming Signals. In peacetime, the aircrew turns off the anticollision light to signal the ground crew to begin arming. In combat, an alternate signal must be used. During the day, hand and arm signals can be used; at night, the cockpit navigation light may be used. If the 68J is wearing the HARRP (CTA 50-900) with communications (HGU-24/P), he can talk with the aircrew.

2-3. TRAFFIC LAYOUT

a. Standard marker panels on departure and arrival points will improve the procedural control of aircraft. Engineer tape, chemical lights, or beanbag lights can be used at night to indicate the desired direction of aircraft movement or the location of ground guides. The aircraft should move to the ground guide's location for arming and refueling. After the aircraft has been serviced, the ground guide should direct it toward the departure end of the FARP. Figure 2-1 (page 2-4) shows the traffic layout at the FARP; Figure 2-2 (page 2-5) shows the FARP layout for simultaneous operations.

CAUTION

If marker panels and engineer tape are used, they must be properly secured to prevent foreign object damage to aircraft.

b. Additional aircraft control can be achieved by maintaining section integrity during FARP operations. Selected waiting areas and separate ingress and egress routes also improve aircraft control. As much as possible, the unit safety officer should be involved in planning safe routes in and out of the FARP and establishing checkpoints along the routes.

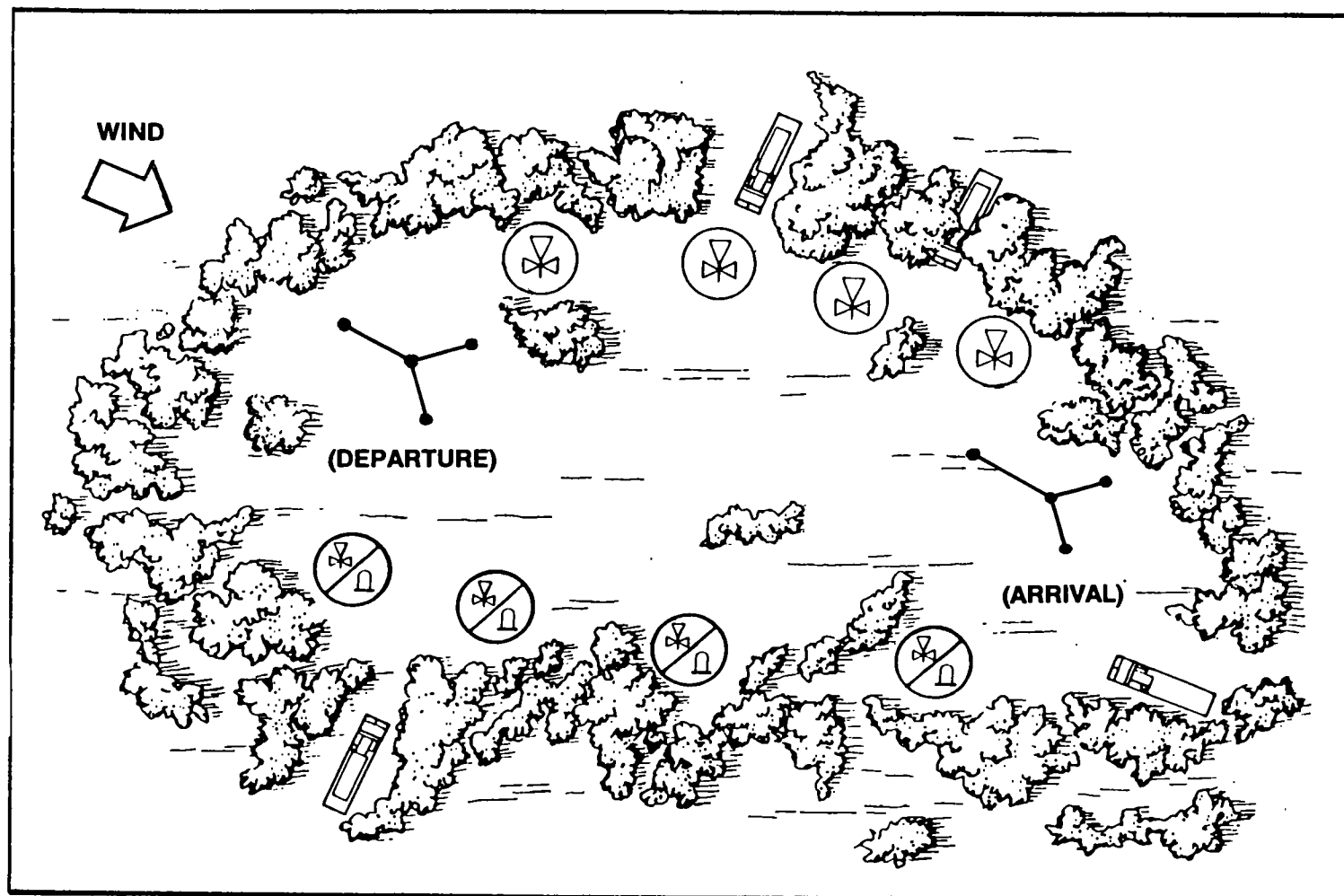


Figure 2-1. Traffic layout at a FARP

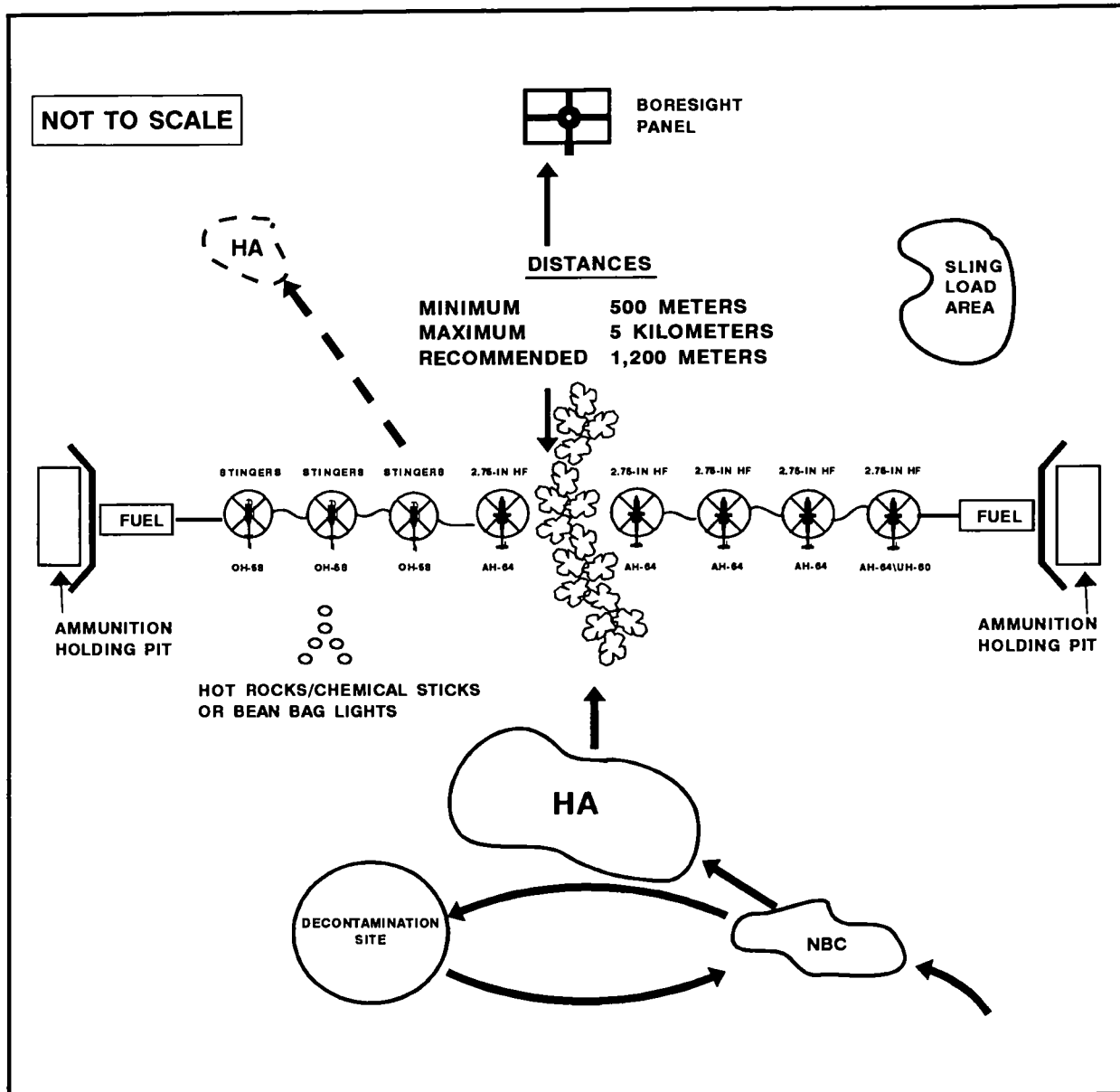


Figure 2-2. FARP layout for simultaneous operations

2-4. COMMUNICATION SIGNALS

a. The use of radios must be kept to a minimum to reduce the enemy's ability to target and engage electronic emissions. However, each FARP should have two FM radios capable of secure voice or secure data burst transmissions. With these radios, FARP personnel can monitor an internal net and a command-designated net (that is, the administration and logistics and the operations and intelligence nets) simultaneously. The internal net would provide FARP personnel with information about the current status of inbound aircraft and ammunition requirements. The command-designated net would provide information that may affect the FARP's operation. Because FM radios are limited by line-of-sight and range, the distance and/or location of the FARP may prevent FARP personnel from monitoring and/or transmitting on the designated command frequency. In such cases, the use of aircraft as retransmitters is an option as long as the factors of METT-T are considered. These radios should be used to transmit only when--

- The FARP is under attack.
- The FARP relocates or ceases operations.
- The FARP is not operational at the scheduled time.
- A request is made to resupply Class III/V products.
- The status of the FARP changes. (In this case, the radio is used to report damage or contamination.)

b. Radios are used only after aircraft have left the FARP and then only when necessary. When possible, outbound aircraft should relay critical messages from the FARP to unit headquarters or unit trains. This will help prevent the enemy from electronically pinpointing the FARP's location for attack. FARP reports and other communications should be made in person.

CHAPTER 3

EMPLOYMENT

This chapter implements portions of STANAG 2946, STANAG 2999, QSTAG 691 and AIR STD 44/31C, and QSTAG 703.

Class III/V assets are assigned to the HHC of the aviation battalion or unit. The HHC must be prepared to sustain aviation forces with fuel and ammunition during maneuver and combat support missions. The success of the aviation mission is directly related to the effectiveness of the FARP and the personnel who run it. Success depends on planning and coordination before FARP operations begin. This chapter discusses employment factors, refueling and arming operations, aircraft flow and mix, and training.

Section I. Employment Factors

3-1. LOCATION

a. The FARP should be located as close to the area of operations as the tactical situation permits. Aviation's inherent mobility provides the division commander with a potent force that can move throughout the entire width and depth of the battlefield at the decisive time and place. Aviation's ability to move quickly also requires that the FARP be able to move quickly to maintain support.

b. On the nonlinear battlefield, the battle may initially be fought by aircraft; long-range artillery; and, as necessary, tailored maneuver forces. Seizing the initiative and holding onto it is crucial on the nonlinear battlefield. The tempo of the battle and the long distances involved will increase the demand for aerial resupply. Depending on how much depth is involved, the FARPs will either be austere and mobile, moving often to support the aviation unit, or they will operate out of an airhead. An airhead provides the security that allows the FARP to remain in place for the duration of the battle. A FARP located in an airhead will have the time and assets to harden itself. Understandably, it will require more personnel to

maintain it. Whether the force is fighting in a linear or a nonlinear battlefield, the factors of METT-T will determine the location of the FARP.

(1) **Mission.** Three types of missions are conducted on the linear battlefield: deep, close, and rear. Each is briefly discussed below.

(a) Normally, the deep attack will not need a FARP established behind enemy lines unless the target is extremely large (multiple mission loads) or the mission is lengthy (more than two hours). In most other circumstances, deep attack aircraft could rearm and refuel at FARPs within the close area. If a FARP must be located behind enemy lines, the following factors should be considered:

- The composition of the FARP should be austere.
- Security will be limited because the FARP will be emplaced for a very short time.
- A thorough map reconnaissance and intelligence update must be accomplished for the area.
- A jump FARP may be necessary if the enemy occupies the roads in the area.
- A helicopter with a sling load cannot fly NOE, which puts it at great risk and broadcasts the unit's intentions.

(b) The FARP is located as close to the area of operations as the tactical situation permits. It is usually located as far forward as 18 to 25 kilometers (METT-T dependent) behind the FLOT and within a committed brigade's area of operation. This distance increases aircraft time on station by reducing the travel times associated with refueling. If possible, the FARP is kept outside the threat of medium-range artillery. Figure 3-1 shows the ranges of threat medium-range artillery. Movement and resupply of the FARP are conducted by ground or aerial means. The FARP should remain in one location for only three to six hours; however, these times may be reduced by the factors of METT-T. The size of the FARP will depend on the number of aircraft that will use the FARP and the type of refueling equipment (FARE or HEMTT) that is available. Four to eight refueling points are normally sufficient.

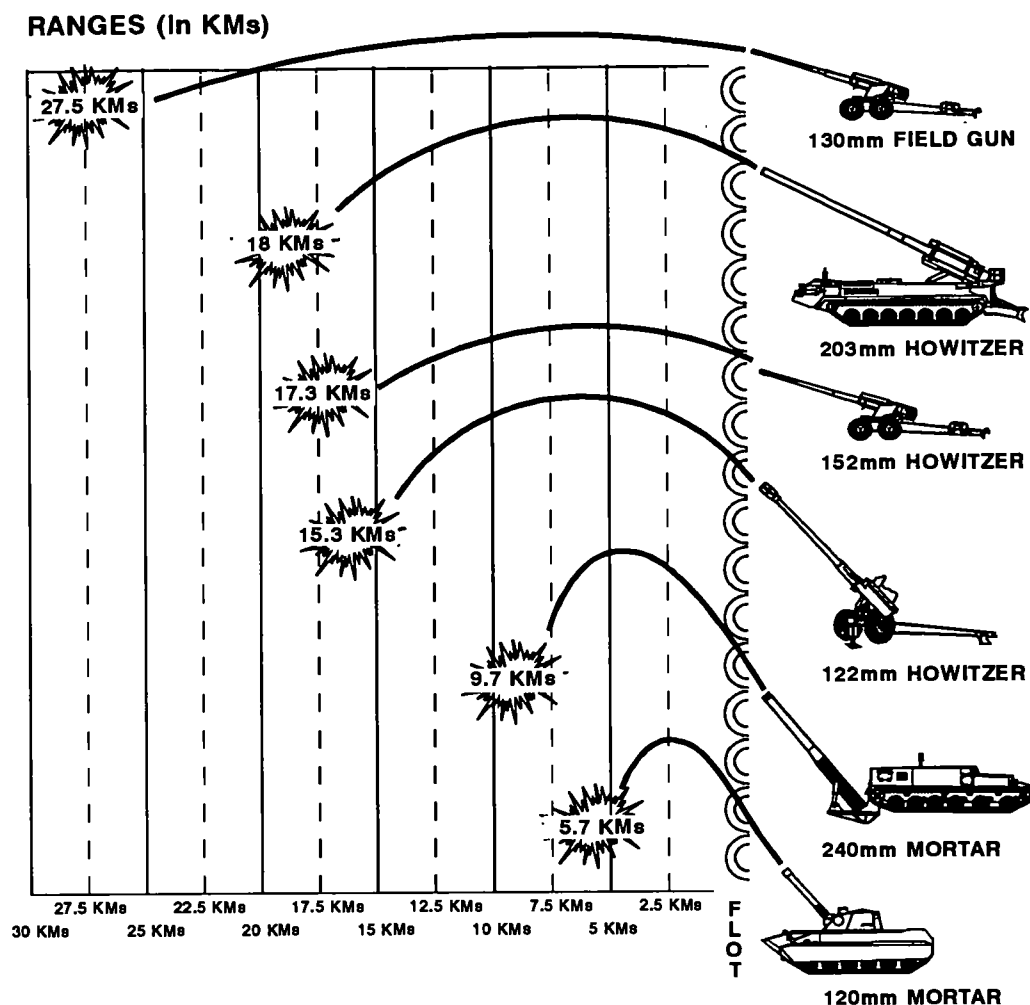


Figure 3-1. Threat medium-range artillery

(c) The aviation brigade provides the commander with a rapid reaction force that can quickly shift its effort and engage enemy forces in the rear area. Depending on their distance from other supply facilities, aviation units in the rear may require FARP support. A FARP located in the rear will probably remain in one location longer than the recommended three to six hours. If so, the FARP must be hardened and have adequate security. Movement and resupply of the FARP can be accomplished by ground or aerial means.

(d) The versatility of the aviation brigade makes it ideally suited to support sustainment operations. The attack helicopter battalion usually emplaces a FARP using its combat trains. At this site, rearming and refueling operations take place for a specific mission. When that mission is complete, the

air assets transition to the field trains FARP site to reconfigure ammunition loads, refuel, and perform the required maintenance in preparation for other missions. Figure 3-2 shows a typical disposition of the division aviation brigade and its support assets. Figure 3-3 shows a battlefield FARP layout.

(e) The BRRP is used by other air assets that require refueling only. The primary purpose of the BRRP is to refuel aircraft as quickly as possible, allowing combat support missions to continue. Rearming operations are not conducted at this site; the BRRP is used only for temporary, specific mission requirements.

(f) Stationary in nature, the DRRP is located in a protected rear area of the DSA. It is manned by the ASB or is task-organized within the aviation brigade. At this site, refueling operations are conducted for transient or organic aircraft. The length of DRRP operations usually depends on the factors of METT-T. Rearming operations are not conducted at the DRRP.

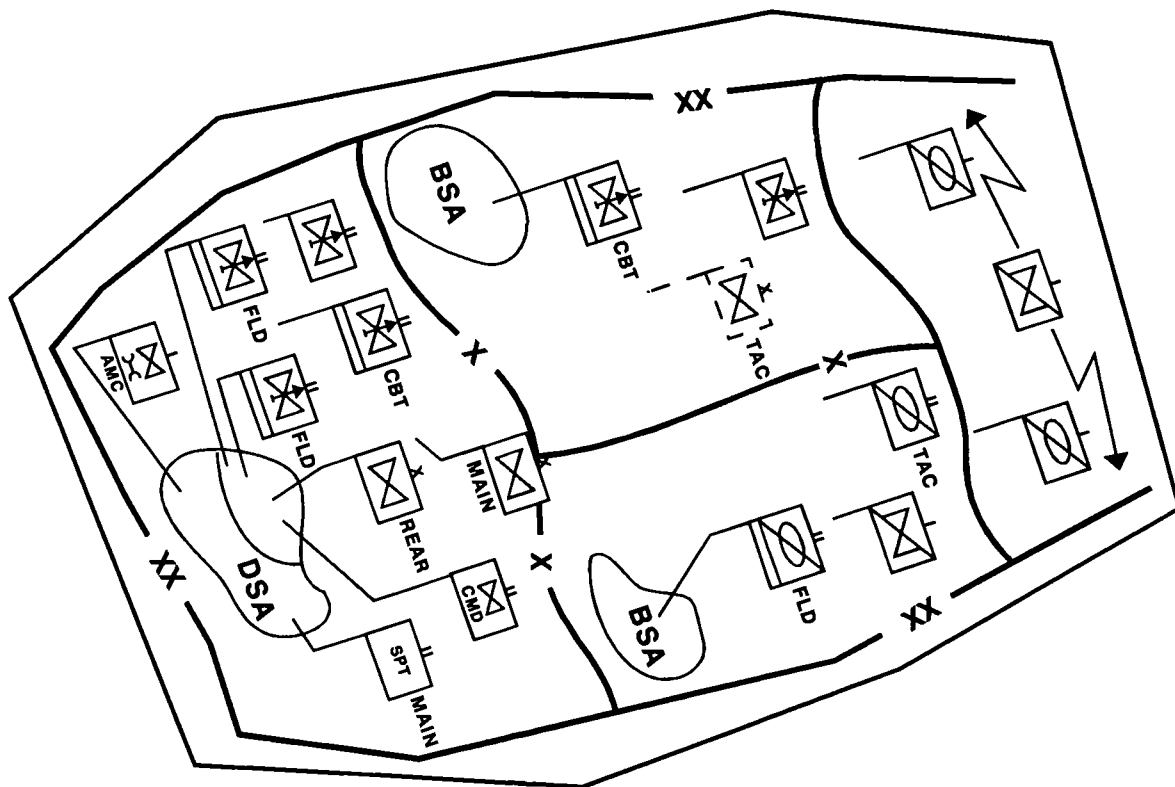


Figure 3-2. Typical disposition of division aviation brigade and its support assets

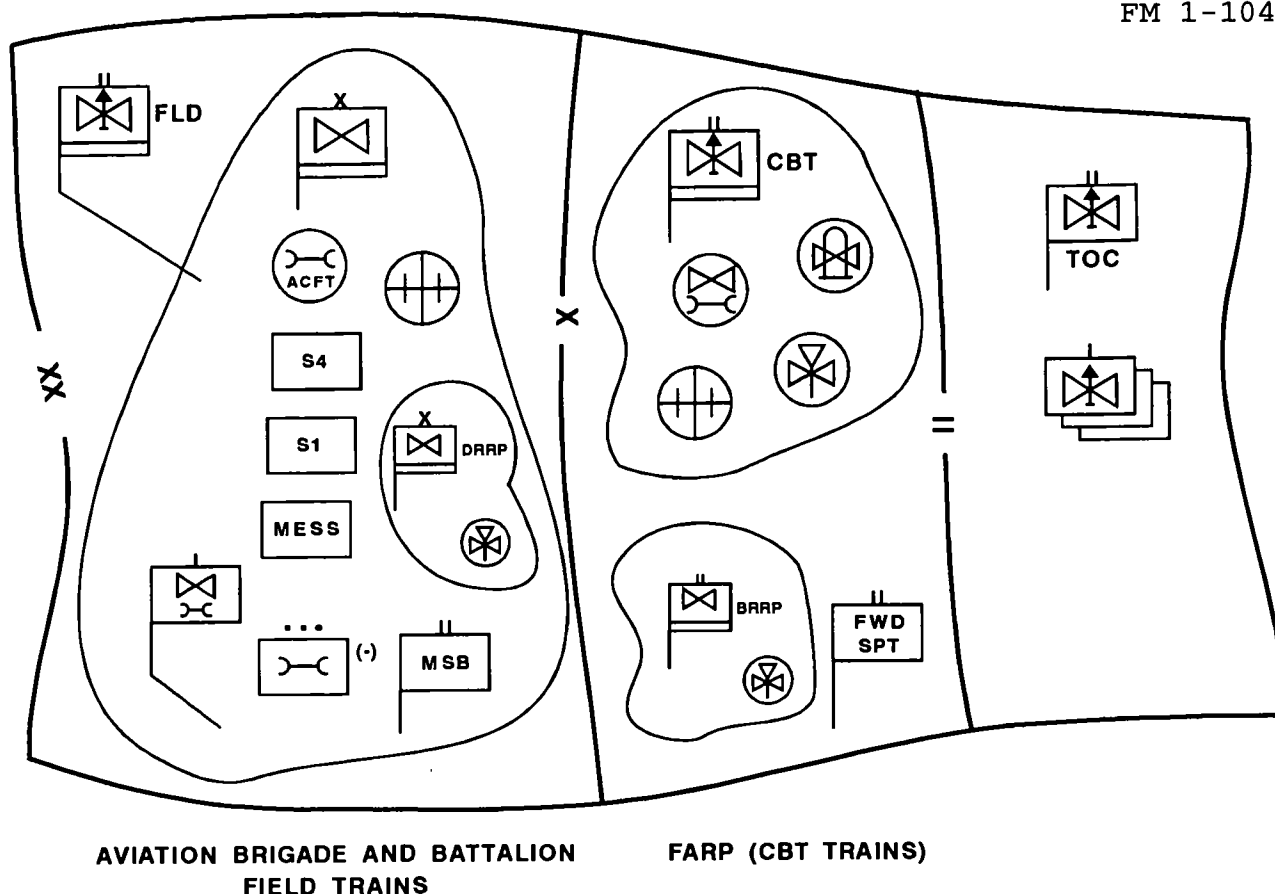


Figure 3-3. Battlefield FARP layout

(2) **Enemy.** The S2 is responsible for determining the type of threat the FARP is likely to encounter in a certain location. This includes the enemy's capabilities, posture, and weapon systems. For example, a FARP located in the close area may encounter an enemy reconnaissance element. A FARP in the rear area may be the target of special operations forces. The S2 also determines the type of intelligence-gathering devices and sensors that the enemy has oriented at the proposed FARP location.

(3) **Terrain.** A good FARP location will allow for the tactical dispersion of aircraft and vehicles. Tree lines, vegetation, shadows, and built-up areas should be used to conceal FARP operations. Terrain folds and reverse slopes should be employed to mask the FARP from enemy observation. Ground main supply routes and air avenues of approach must be masked so that the enemy cannot target the FARP visually or electronically.

(4) **Troops.** The platoon leader must determine if enough troops are available to operate the desired size and number of

FARPs and to complete resupply deliveries in the allotted time. Also, the proper personnel skills must be available in the proper numbers. For example, the 68J is school-trained to arm and repair weapon systems. Other personnel at unit level must be cross-trained to fuel aircraft and load weapon systems, but they cannot be cross-trained to perform specific repair functions. Depending on the location of the FARP, the number of soldiers required to provide security will vary. In most cases, the FARP will provide its own security.

(5) **Time available.** The duration of the mission is a critical planning factor. The longer the mission, the more security and Class III/V products the FARP will require. Planners must consider how long it will take to drive or fly to the proposed FARP site. They must also plan how long it will take to set up a two-point FARE system versus a four- or eight-point HEMTT system and how far the system is from the supply trains. Driving the HEMTT to and from the supply trains may take too long.

3-2. EMPLACEMENT

a. The FARP can be emplaced by either ground or aerial means. The means of emplacement will depend on the system's mobility, mission aircraft requirements, enemy situation, higher-echelon support, and expected operational time. The FARP should be designed so that a trained team can quickly place it into operation. This team should be able to load and move without leaving behind any debris, fuel, ammunition, or equipment. To accomplish this, the FARP should be employed only with those assets it needs for the mission. Appendix B discusses the emplacement of the FARP by ground or air, and Appendix C shows an example of a FARP operations annex to a tactical SOP.

b. FARPs are normally emplaced using ground vehicles that carry bulk quantities of Class III/V products. Ground mobility offers the advantages of responsive FARP mobility and the ability to carry large amounts of bulk POL. Ground vehicles are the primary means to displace and resupply the FARP. However, ground-mobile FARPs have several disadvantages. Ground vehicles limit the rapid positioning of FARPs; they are subject to road and traffic conditions. Potential site locations become limited by their vehicular accessibility. Resupply is normally accomplished by the same vehicles transporting the FARP. If a single vehicle is lost, the success of the mission may be jeopardized. Therefore, a backup operation must be planned.

c. Emplacing the FARP by air offers two significant advantages. The first advantage is speed; obviously, a FARP can be moved about the battlefield much faster by air than by ground

transportation. The second advantage is that every open field becomes a potential FARP site. Air-emplaced FARPs also have disadvantages. Aerial emplacement of FARPs depends on the availability of supporting aircraft. Rapid displacement is only possible if utility or cargo aircraft are dedicated to support the FARP. If the FARP comes under attack and no cargo or utility aircraft are available, the entire FARP can be lost. If the FARP is contaminated by NBC attacks, it cannot be moved until it has been decontaminated. Otherwise, the commander must accept the contamination of support aircraft and the spread of contamination to clean areas.

d. Resupplying the FARP by air requires dedicated aircraft to move bulk quantities of Class III/V products. The additional aircraft traffic could compromise the FARP's location, increasing the likelihood of an enemy attack. Aircraft that are sling loading equipment and supplies cannot fly NOE. Therefore, they will be more vulnerable to enemy sensors and radar-directed air attacks. Moving the materiel handling equipment will also require dedicated aircraft. Although the MHE can be sling loaded, it may be impractical to use aircraft assets to transport a rough-terrain forklift. However, the absence of MHE can seriously degrade the ammunition-handling and breakdown capability of the FARP.

e. The most efficient use of assets combines ground and air capabilities. When time is critical, the FARE, limited quantities of Class III/V products, and required personnel can be aurally emplaced. The rest of the Class III/V products, MHE, and support personnel can then be moved to the site with ground transportation. The FARP should only be aurally resupplied when the expenditure rate exceeds the organic ground support capability of the unit or when ground resupply routes are occupied by the enemy. Cargo or utility aircraft could temporarily augment ground vehicles until the supply flow returns to normal or the enemy no longer threatens the supply routes.

3-3. MOVEMENT PLAN

a. The movement of the FARP should be planned to include an advance party, march tables, a route reconnaissance, and alternate site locations. Detailed planning of the move will improve the accuracy of the FARP's operational time. Planning should include details about individual vehicle and trailer load plans. Standard load plans do not exist for current equipment because equipment varies in each unit's MTOE. Also, the varying Class V requirements for different missions will greatly affect vehicle load plans. Appendix D contains suggested load plans.

b. In a FARP convoy, the platoon should use concealed routes as much as possible. If the FARP is attacked while moving, vehicles should turn 90 degrees from the direction of the attack. (Aircraft normally attack parallel to the movement of a convoy.) This countermeasure quickly removes vehicles from the line of fire.

c. Air guards should be posted on vehicles and in dismounted positions to warn of approaching aircraft. They should be rotated often because scanning for long periods dulls an individual's ability to spot approaching aircraft. Vehicle horns are the standard method of warning for an air attack. FMs 9-16 and 55-30 contain additional information on conducting a convoy.

d. An advance party, equipped with NBC detection equipment, and a security team should be sent to the proposed site to determine its suitability. If the site is not suitable for FARP operations, then time would be available to move the FARP to an alternate location. If the site is usable, the advance party will identify areas for the placement of equipment. When the rest of the FARP personnel and equipment arrive, the advance party should guide each vehicle into its position.

3-4. SECURITY

a. The FARP should have enough organic security to defend itself against the anticipated threat. Too much security equipment will hinder the movement of the FARP. However, inadequate security will rob the FARP of its ability to protect itself long enough to move. The unit must coordinate with the operational brigade responsible for the sector in which the FARP is located for air defense and, if necessary, ground security to protect the FARP. Normally, the FARP will be integrated into the brigade's AD umbrella. The supported brigade or division may provide Stinger assets for FARP air defense. AD assets must be in positions that protect the FARP from aerial attack. For example, the Stinger should be placed 3 kilometers from the FARP. If the FARP is designated a priority target, then division AD assets--such as Chaparral and other forward area weapon systems--are employed near the FARP. These AD assets should cover friendly ingress and egress routes. Checkpoints should be established for friendly aircraft using the FARP to provide positive identification to AD teams. Stinger assets also should be employed to protect the FARP during convoys.

b. The advance party may include Stinger assets, NBC attack monitoring and warning equipment and personnel, and crew-served weapons. The first asset that should be employed is the NBC attack monitoring and warning equipment. Monitoring equipment

must be placed upwind of the FARP site. A limited antitank capability can be provided by using light antitank weapons. If available, electronic early warning systems should be placed on likely avenues of approach not covered by listening or observation posts. Quick reaction forces may be formed from attack helicopters in or near the FARP. A quick reaction force may also be formed from nonflying members of the unit that have been organized into a reaction team.

c. If the FARP is attacked, FARP personnel must be able to execute a scatter plan, which includes movement to rallying points. These points increase personnel survivability and allow personnel to regain control of the situation.

3-5. RELOCATION

a. Several guidelines determine the relocation of a FARP. By definition, the FARP should be temporary, not staying anywhere longer than three to six hours (unless it is hardened and located in a secure area such as an airhead). When the battle lines are changing rapidly or when the rear area threat dictates, the FARP must be moved often. In a static situation, frequent movement of the FARP may not be necessary. Where air parity or enemy air superiority exists, the FARP must be moved often. The FARP should be moved only after it fulfills the support requirements of mission aircraft.

NOTE: If NBC contaminants exist, equipment should be decontaminated before it is moved from the FARP site.

b. A FARP may be relocated for any of the following reasons:

- The FARP comes under attack.
- The order to relocate is received by radio.
- A face-to-face message is received to relocate.
- A preplanned relocation time has been set.
- A preplanned relocation occurs after a specific event; for example, after the FARP has serviced a specific company or a specific number of aircraft.
- The last element to use the FARP delivers the message to relocate it.
- A decision or trigger point is used.

c. The message to relocate a FARP is passed in FRAGO format and will contain, as a minimum, the following information:

- Eight-digit grid coordinate of the next site and alternate site.
- Time the FARP is to be mission ready.
- Fuel and ammunition requirements.
- Passage-of-lines contacts, frequencies, call signs, and ingress and egress points.
- Enemy situation at the next site.
- March table or movement overlay.

d. If time allows, a map reconnaissance and a survey of the proposed site should be conducted before a FARP site is selected. A site survey is critically important; maps may not be current and sites are not always as they are depicted on the map. For example, an open field on a map may actually be overgrown with trees.

e. Once ordered to relocate, the FARP elements should begin an orderly movement. After the FARP has been moved, no evidence should remain that the area was ever occupied.

(1) Advance party actions.

(a) The advance party breaks down one unit, consisting of one HEMTT or one FARE. Next, it rolls up and packs hoses and refuels the tanker if fuel is available. The advance party then transports, when possible, enough ammunition for two mission loads per aircraft, rolls up the camouflage nets, and sets up a convoy.

(b) When the convoy is ready, the advance party moves out to the new location. Upon arrival, personnel establish security, conduct an NBC survey, reconnoiter the site, and perform other tasks outlined in the unit SOP and the applicable ARTEP publication. If the site is unsuitable or the enemy is nearby, the advance party reports this information to the TOC. The advance party then requests to move to the alternate site and

notifies the remaining FARP elements. When the site is deemed suitable, the advance party--

- Determines the landing direction.
- Determines and marks refuel and rearm points, truck emplacements, and ammunition emplacements.
- Sets up the equipment.

(2) **Remaining FARP element actions.** The remaining FARP elements break down the remaining points in the same manner and sequence as described above. When personnel arrive at the new site, they move into new locations as directed by the advance party and set up the arming and refueling points.

3-6. SITE PREPARATION

a. The FARP site will be policed before operational use. Sticks, stones, and other potential flying objects should be removed to prevent injury to personnel or damage to equipment. The rotor wash from a helicopter can cause these objects to become hazards. In addition, scrub brush, small trees, or other vegetation may need to be cleared from landing and takeoff areas. The use of predesignated landing, takeoff, and hovering areas will minimize accidents, incidents, or injuries. The areas around the rearming and refueling points and the pump assemblies should be cleared of dried grass and leaves to prevent potential fires.

b. Aircraft may sink in wet, snow-covered, thawing, or muddy ground. Pierced steel planking or other suitable material, staked to the ground, can be used to reinforce the ground.

3-7. MULTIPLE OPERATIONS

a. The degree of air superiority and the factors of METT-T will determine the number of FARPs and the number of refueling points at each FARP. Multiple FARP operations may be necessary. To accomplish this, assets should be arranged to set up two or three independent and mobile FARP operations. The ideal situation would include active, silent, and jump FARPs.

(1) The active FARP is conducting refueling and rearming operations. The silent FARP has all equipment and personnel at the future site, but it is not operational. The jump FARP is employed for a special mission. It is composed of a FARE, 500-gallon collapsible fuel drums, and/or ammunition (as the mission dictates). The jump FARP is transported and emplaced by ground or air and employed when dictated by time or geographical

constraints. It allows the uninterrupted support of attack elements during FARP relocation and resupply.

(2) The mode of transportation is determined by the availability of assets and the urgency of the mission. No FARP should stop operation until another FARP becomes operational unless the tactical situation demands otherwise. Splitting Class III/V personnel and equipment into three independent FARPs will be difficult. The organization of each FARP will depend on the mission and the way the commander wants to employ his FARPs. Appendix E describes multiple FARP operations.

b. The timing of supplies must be coordinated when multiple FARPs are used. If Class III/V supplies are being pushed forward, the FARP should stop receiving supplies at a designated time. The time should be based on estimated Class III/V usage rates and should allow the FARP to use all of its supplies. Any Class III/V products not used should be transported to the new site. Otherwise, the supplies should be camouflaged and picked up later. The supplies should be destroyed only as a last resort. TM 750-244-3 provides guidance on the destruction of assets.

c. A typical ground-emplaced mobile FARP consists of a HEMTT tanker aviation refueling system, a HEMTT cargo truck with trailer, and a HMMWV or CUCV. This mobile FARP can rearm and refuel four aircraft simultaneously. The HMMWV is used to lead vehicles to planned FARP locations. When the mobile FARP requires additional Class III or Class V products, it may proceed to the battalion trains area for resupply or it may be aerially resupplied.

3-8. DAMAGED OR DESTROYED ASSETS

a. Once the location of the FARP has been compromised, the site must be vacated. The nature of the compromise will determine what can be taken from the site. The refueling equipment must be saved if possible. Without the FARE, getting the fuel out of storage tanks and tankers into aircraft will be difficult. The 5,000-gallon semitrailer and HEMTT tankers have the capability to remove fuel from storage containers.

b. Damaged or destroyed assets must be replaced quickly, or the unit's mission may be disrupted. The chain of command must be notified at once of any change in operational status. The HHC commander must report injuries to personnel and damage to vehicles, equipment, and supplies to the S4 by the quickest means possible. Replacement items should be sent to the requesting FARP as soon as possible. If the assets are not available in the unit, emergency support may be available from other brigade

sources. This support could range from borrowing equipment to using another battalion's FARP. Unit elements must be informed of any changes in the status of the FARP sites to include alternate arming and refueling instructions.

c. Equipment or products to be saved must be prioritized before the mission starts; all FARP personnel must be informed of the priorities. For example, keeping Hellfire missiles from the enemy would be a high priority because the missiles are expensive and in short supply. In addition, the FARE is critical for getting the fuel from the source to the aircraft.

Section II. Refueling Operations

3-9. FORWARD AREA REFUELING EQUIPMENT

a. Equipment at the refueling site for the FARE system (NSN 4930-00-133-3041) consists of a pump assembly, a filter/separator, hoses, nozzles, grounding equipment, and valves. Other support equipment which is not a component of the FARE includes the fuel source and the fuel sampling kit.

(1) **Pump assembly.** This pump has two hose connections and is rated at 100 GPM. When two hoses are used, actual flow rate may be as low as 50 GPM.

(2) **Filter/separator.** The filter/separator provided with the FARE is rated at 100 GPM. It has a working pressure of 75 psi.

(3) **Hoses, nozzles, grounding equipment, and valves.** This equipment must be available to support the FARE setup that is envisioned; that is, the one-point or two-point setup.

(4) **Support equipment.** Support equipment includes items such as fire extinguishers, grounding rods, waste cans, 5-gallon water cans, and absorbent material. The FARE system without a fuel source weighs 840 pounds and occupies 64 cubic feet.

(a) **Fuel source.** The fuel source is usually 500-gallon collapsible drums. However, other sources may be used. They include 600-gallon pods, 1,200-gallon TPU, 3,000- or 10,000-gallon collapsible tanks, 2,500-gallon HEMTT tanker, 5,000-gallon semitrailer, railroad tank cars, and fuel tanks of an USAF cargo plane.

(b) **Fuel sampling kit.** The model that should be used is Aqua-Glo Series III (NSN 6630-00-706-2302).

b. Skilled, experienced personnel can set up a FARE within 15 minutes of its delivery to a site. The ammunition portion of the FARP can be set up within 45 minutes of delivery to a site. This time includes the unpacking of ammunition.

3-10. FARE SITE LAYOUT

a. The setup of the FARE system should take advantage of terrain features, achieve maximum dispersion, avoid obstacles, and accommodate the type of aircraft the FARP will service. When planning the layout of the FARE system, personnel must consider the minimum spacing required between aircraft during refueling. The spacing will depend on the type of aircraft and its rotor size. Proper spacing reduces the possibility of collision and prevents damage caused by rotor wash. The minimum rotor hub to rotor hub spacing for all helicopters, except the CH-47, is 100 feet. When CH-47s land side by side to refuel, the minimum rotor hub to rotor hub spacing is 180 feet. When they land nose to tail, the minimum spacing required is 140 feet.

b. If the area has a prevailing wind pattern, the refueling system should be placed at a right angle to the wind. Thus helicopters can land, refuel, and take off into the wind. The refueling points should also be laid out on the higher portion of a sloped site, not in a hollow or valley. Fuel vapors are heavier than air, and they flow downhill. Also, the fuel source should be kept downwind of the aircraft's exhaust to reduce the explosion hazard. These same considerations apply to any FARP set up with the FARE, 5,000-gallon semitrailer tanker, or HEMTT. Aircraft movement should be limited in desert and snow environments where wind and rotor wash may cause brownout or whiteout. Special considerations will be necessary when aircrews are operating with night vision devices. Figure 3-4 shows a FARE setup under various wind conditions.

3-11. EQUIPMENT SETUP

a. Several checks must be made to ensure that the refueling equipment is set up properly. The pump assembly and filter/separator must be properly grounded and checked for leaks before operation. The pump engine should be checked for oil leaks and oil level. The pressure differential indicators of the filter/separator should be checked. Filter elements should be replaced and accumulated water drained as necessary.

b. Couplings should be properly seated and free of cracks. Slippage usually will show first as a misalignment of the hose and coupling. Sandbags should be used to elevate the couplings, which facilitates preoperational checks and fuel leak detection.

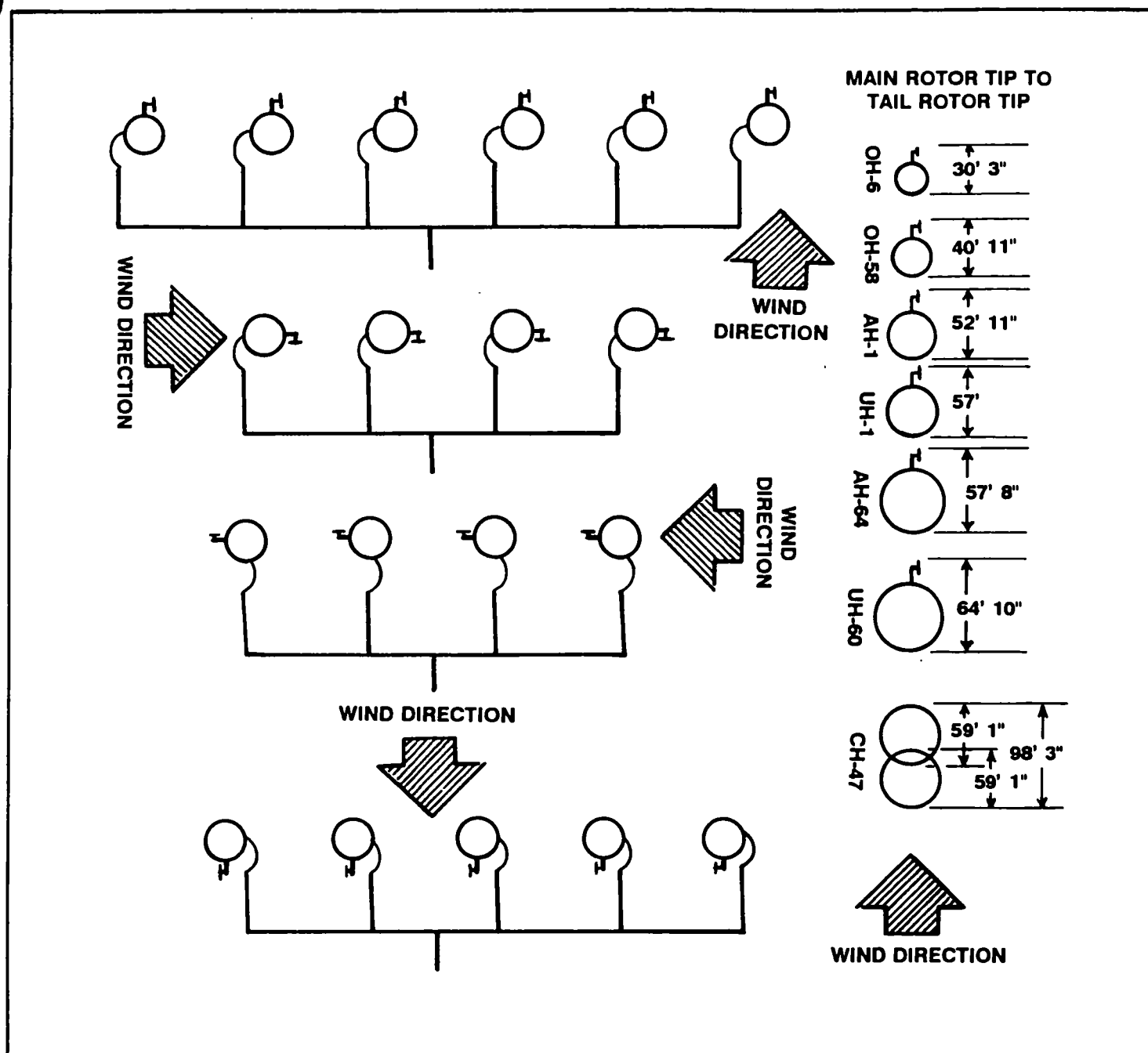


Figure 3-4. FARE setup under various wind conditions

c. The exterior of the hoses should be checked for signs of blistering, saturation, and nicks or cuts. The hoses should be removed from service if a significant amount of reinforcement material is exposed. The hose should be checked for weak or soft spots within 12 inches of the couplings where most failures occur. If weak or soft spots are found, the hose should be removed from service. The hose should be tested at normal operating pressure. Abnormal twisting or ballooning is also an indication that the hose should be replaced.

d. Nozzles must have serviceable couplings and dust covers. Each refuel point must have all of the required nozzles to conduct closed-circuit and open-port refueling operations. The nozzle filter screen will be checked daily. Each nozzle has two ground wires. One has an alligator clip on the end of it; it is the grounding cable. The other wire has a plug; it is the bonding wire. These wires are used to connect the aircraft to a 5-foot grounding rod. The nozzle can be kept off the ground by hanging it on the grounding rod. Appendix F contains a FARP checklist.

e. A dust cap or plug should never be removed from an opening until it is ready to be coupled to the next piece of equipment. The reverse procedure should be followed when uncoupling. The equipment is drained immediately after uncoupling. Removed caps and plugs should be coupled together to keep them clean.

WARNING

As an aircraft moves through the air, static electricity builds up on it. Static electricity also builds up on the refueling equipment when fuel is pumped through the hoses. The aircraft, fuel nozzle, and pump assembly must be grounded to prevent sparks and explosions. Static electricity buildup is greater in cool, dry air than in warm, moist air.

3-12. SUPPORT EQUIPMENT

a. A fire extinguisher must be located at each refueling nozzle and at the pump and filter assembly. A water can and waste fuel pan should be located at each refueling point. This would enable operators to wash fuel off skin and clothes, wash dirt off fuel nozzles, and contain fuel if a spill occurs.

b. A waste fuel pan is required to limit fuel spillage. Fuel spills will be recovered; contaminated soil will be dug up and placed in containers. The containers will be disposed of according to the unit SOP. If the spillage is 50 liters (13.2 gallons) or more, the local facility engineers must be notified. The spillage will also be reported to the environmental protection person, who will determine the actions necessary to retrieve the spillage.

c. Unit SOPs will include a waste fuel plan for all refueling operations during peacetime. FM 10-68 and Chapter 7 of this publication contain more information on fuel spills.

WARNING

All fuel spills will be considered a fire and an environmental hazard.

3-13. PERSONNEL REFUELING REQUIREMENTS

a. Three persons are required to refuel an aircraft. One person operates the fuel nozzle, the second remains at the emergency fuel shutoff valve, and the third mans a suitable fire extinguisher. The third person stands outside the main rotor disk of the aircraft at a point where he can see both the pilot at the controls and the refueler with the nozzle. This person may be from the FARP or one of the aircraft crew members. In a combat situation, METT-T may override the availability of a third person to operate the fire extinguisher.

b. The refueler must wear protective clothing. This consists of a uniform, a helmet, goggles, hearing protection, gloves, and leather boots. Each item is briefly discussed below.

(1) Uniform. A serviceable fire retardant flight suit or battle dress uniform will be worn with the sleeves rolled down.

(2) Helmet. The HARRP (CTA 50-900) is the authorized helmet. Two versions are available for issue: the HGU-24/P (communications-equipped) and the HGU-25/P (aural protector only). The helmets are provided in four hat sizes and include eye protection. The cranial impact shells are available in seven different colors and can be used to differentiate between the functions of personnel in the FARP (for example, POL, ammunition, medical, and maintenance personnel). The decision to use different colored cranial impact shells will depend on the factors of METT-T. If the HARRP is not available, a motorcycle

helmet, a flight helmet, a kevlar helmet, or an infantry helmet is acceptable.

(3) **Goggles.** Sun, wind, and dust goggles (CTA 50-900) will be worn if the HARRP or flight helmet is not available.

(4) **Hearing protection.** Earplugs, ear protectors, or both will be worn.

(5) **Gloves.** Gloves must be worn at all times during refueling operations. If they become saturated with fuel, they should be replaced. CTA 50-900 lists specific gloves that are authorized for refueling operations.

(6) **Leather boots.** The standard rubber-soled, leather combat boots will be worn. Boots will not have heel or toe taps or cleats. Any metal on the sole, to include exposed nails on a worn-down sole, could cause a spark on contact with a hard surface. Fuel vapors are heavier than air; a spark at ground level could cause a fire.

c. If a fuel handler's clothes become soaked with fuel, the fuel handler should--

- Discontinue the refueling operation and leave the area immediately.
- Wet clothes with water before taking them off. (If water is not available, the fuel handler should hold onto a grounding rod to prevent sparks when removing his clothes.)
- Wash fuel off the skin with soap and water as soon as possible.

WARNING

1. If fuel is splashed in the eyes, flush eyes with water and seek medical attention immediately.
2. If fuel is swallowed, seek medical attention immediately.

WARNING

Entering a warm room wearing fuel-soaked clothing can be dangerous. The chance of a fire starting because of static electricity is increased.

3-14. REFUELING

Refueling can be accomplished with the aircraft engines running (hot or rapid refuel) or with the engines off (cold). In a field environment, a unit will normally use the "hot" refueling method. The two hot methods of refueling an aircraft are open-port refueling and closed-circuit refueling.

NOTE: POL handlers should be aware that the rate at which fuel is pumped differs with each type of aircraft.

a. Open-Port Refueling. Open-port refueling is accomplished with an automotive type nozzle, which is inserted into a fill port of a larger diameter. It is not as fast nor as safe as CCR. The larger port allows fuel vapors to escape. Also, airborne dust, dirt, rain, snow, and ice can get into the fill port during refueling; therefore, the quality of the fuel could be lowered. Spills from overflowing tanks also are more likely. Rapid refueling by the open-port method is restricted to combat or vital training. In these cases, the aviation unit commander makes the final decision. Simultaneous arming and open-port refueling activities will only be conducted when the combat situation and benefits of reduced ground time outweigh the risks involved.

b. Closed-Circuit Refueling. CCR is accomplished with a nozzle that mates with and locks into the fuel tank. This connection prevents fuel spills and vapors from escaping at the aircraft fill port and reduces fuel contamination.

(1) The Army has two systems: the closed-circuit refueling system and the D-1 pressure system (also called the centerpoint system). The D-1 pressure system components, except for the receiver, are mounted on the M970 (5,000-gallon semi-trailer tanker) and M978 HEMTT (2,500-gallon tank vehicle). The UH-60, AH-64, and CH-47 are equipped to use the D-1 nozzle.

(2) The main difference between the CCR nozzle and the D-1 nozzle is that the D-1 nozzle provides a higher fuel flow rate. Also, the CCR nozzle can be adapted to open-port refueling; the D-1 nozzle cannot. The CCR nozzle is 2 inches

wide; the D-1 nozzle is either 2 1/2 inches or 3 inches wide. The CCR provides 100 GPM compared to 150 to 200 GPM for the 2 1/2-inch D-1 nozzle and 300 GPM for the 3-inch D-1 nozzle.

NOTE 1: The pilot is normally responsible for signaling the refueler when to stop refueling the aircraft. In AH-series aircraft, the pilot is responsible for monitoring the fuel gauge.

NOTE 2: A 15-psi differential return pressure restricts the fuel flow rate of the AH-64 to 56 GPM during closed-circuit refueling.

Section III. Ammunition Operations

3-15. AMMUNITION STORAGE

a. The ready ammunition storage area is separated from the helicopter rearm pads by a barricade. The RASA contains the ammunition required to support the arming of aircraft. Ready ammunition is that quantity of ammunition required to support the mission beyond the amount needed for one load. The RASA should have separate cubicles for the assembling and disassembling of rockets, aircraft flares, and malfunctioned ammunition. More information is contained in AR 385-64 and TM 9-1300-206.

b. The basic load storage area is a separate area from the RASA. The BLSA contains the specific quantity of ammunition required and authorized to be on hand at the unit to support three days of combat. A basic load includes a variety of ammunition such as small arms, grenades, and mines in addition to aircraft specific ammunition.

c. Personnel store ammunition by lot number at all locations so that all lots on hand can be properly accounted for. Ammunition handlers must maintain accurate lot number records so that ammunition malfunctions can be properly documented and reported. Personnel will ensure that lots are not mixed at the RASA, at the BLSA, or on the rearm pads. A good way to maintain lot integrity is to not mix items; that is, to keep like items together.

d. It may be necessary for personnel to improvise a means to transport ready ammunition to the rearm pads where aircraft will be armed. Improvised trailers or carts may be used with the following restrictions:

- The rated load weight of the trailer or cart must not be exceeded.
- The load must be secured and balanced to prevent the ammunition from tumbling or the vehicle from tipping over.

- The trailer or cart must be covered to protect the ammunition in inclement weather.

3-16. AMMUNITION SAFETY PROCEDURES

All personnel must observe required safety procedures to prevent the accidental firing of ammunition or propellants. Improper handling or stray electricity may cause ammunition to explode and result in loss of life or serious injury to personnel.

a. Fin protector springs are designed to short-circuit the igniter leads, thus preventing accidental ignition. The shorting wire clips and fin protectors must be installed on all rockets immediately after an aircraft launcher is unloaded and when the rockets are not in a launcher. A sufficient quantity of clips and protectors must be on hand at each rearm pad. Therefore, personnel should not discard the clips and protectors once an aircraft is armed. Also, personnel should remember that the wires and clips can cause foreign object damage to aircraft if they are not properly secured.

b. Complete rounds, rocket motors, or fuze-warhead combinations that have been dropped may cause the fuze or warhead to function prematurely. This may result in the loss of a life or an aircraft. Rocket motors and complete rockets that have been dropped from higher than 2 feet, whether crated or uncrated, must be turned in to the supporting ASP. DA Form 581 (Request for Issue and Turn-in of Ammunition) must reflect the reason for the rejection.

c. Personnel must assemble rockets according to the instructions in TM 9-1340-222-20. Returned unfired rockets and rockets remaining in aircraft launchers after a mission must be retorqued before the next mission.

d. Barricades must be built around the RASA, the BLSA, and the rearm pads. Barricades should be at least 3 feet thick to effectively reduce hazards from a fire or an explosion. Rocket motors may go off, so they should be placed with the nose end facing the back of the barricade.

e. Ammunition should be protected from the weather. If ammunition is covered in a high-temperature environment, it is important to ensure that the covering does not create excessive heating of the ammunition. As was learned in Southwest Asia, dark covers placed directly on pallets of ammunition can create temperatures up to 180°F. Missile systems especially can be damaged by these high temperatures. The covering selected for use in high-temperature environments should shade the ammunition and provide for air circulation.

f. Rockets should not be stored on top of one another. The weight will damage the bottom layers. If rockets need to be unpacked, they should be stored on racks built at the site. Rockets should not be stacked directly on the ground. Wooden pallets are practical to place under the rockets since they allow air to circulate. The rockets should be blocked to keep them from rolling off the stack.

g. For maximum safety, the amount of ammunition stored at the RASA and the rearm pads should be kept to a minimum. The following limits--designed to meet operational needs--should not be exceeded:

(1) Each rearm pad is limited to the ammunition required to fully arm one aircraft plus the number of rockets required for a second load. This facilitates switching the missile launcher for rocket launchers if the mission dictates.

(2) The ammunition for a second aircraft should be stored off the pad, properly covered, and barricaded.

(3) The RASA is limited to 2,000 pounds of NEW per cubicle. The following example illustrates this limitation: 1,340 of H490 (10 pounds NEW) = 200 rounds per cubicle (200 x 10 = 2,000). The NEW is computed based on the weight of the explosive filler in the item of ammunition. In the case of rockets, the NEW is the combined explosive weight; that is, the amount of explosive filler and the propellant in the motor. Table 3-1 shows the common items used during helicopter rearm operations. Table 3-2 shows the minimum distances permitted between rearm points, ready ammunition storage areas, and nonammunition-related activities that require safety distances. Inhabited buildings also include tents used as living quarters.

Table 3-1. Common items used during helicopter rearm operations

ITEM	NET EXPLOSIVE WEIGHT (Per Round)
Hellfire missile	34.4 pounds
TOW missile	12.18 pounds
Rocket, 2.75-in, HE (H489 or H490)	10 pounds
Rocket, 2.75-in, HE (H488 or H534)	11 pounds
Cartridge, 40-mm, HE (B468)	2 ounces
Cartridge, 30-mm, HE (B130 or B131)	.058 ounces
Cartridge, 20-mm, HE (A653)	.028 ounces
Small arms ammunition	None

Table 3-2. Distances between rearm points and ready ammunition storage areas

FROM	TO	REQUIRED DISTANCE (In Feet)	
		Barricaded	Unbarricaded
Rearm point	Rearm point	100*	100*
Rearm point	Inhabited buildings and unarmed aircraft	400	800
Rearm point	Public highways	240	480
Rearm point	POL storage or refuel facilities	450	800
Ready ammunition storage area	Rearm point	75	140
Ready ammunition storage area	Inhabited buildings and unarmed aircraft	505	1,010
Ready ammunition storage area	Public highways	305	610
Ready ammunition storage area	POL storage or refuel facilities	505	1,010
*Distance is based on rotor clearance.			

Section IV. Arming Operations**3-17. ARMAMENT PAD SETUP**

The setup of the armament pad will affect overall aircraft turnaround times. During combat missions, enough ammunition for at least one arming sequence should be placed on the armament pad before the aircraft arrive. The ammunition should be laid out in the order it will be loaded. A full load of ammunition must be ready to load in case the aircraft has expended all of its initial load. Figure 3-5 shows two typical layouts for helicopter rearm points, and Figure 3-6 shows a three-dimensional view of one plan.

NOTE: An aircraft is positioned so that its weapons are not pointed toward the fuel source, ammunition holding area, or troop sleeping tent in case a weapon discharges by accident.

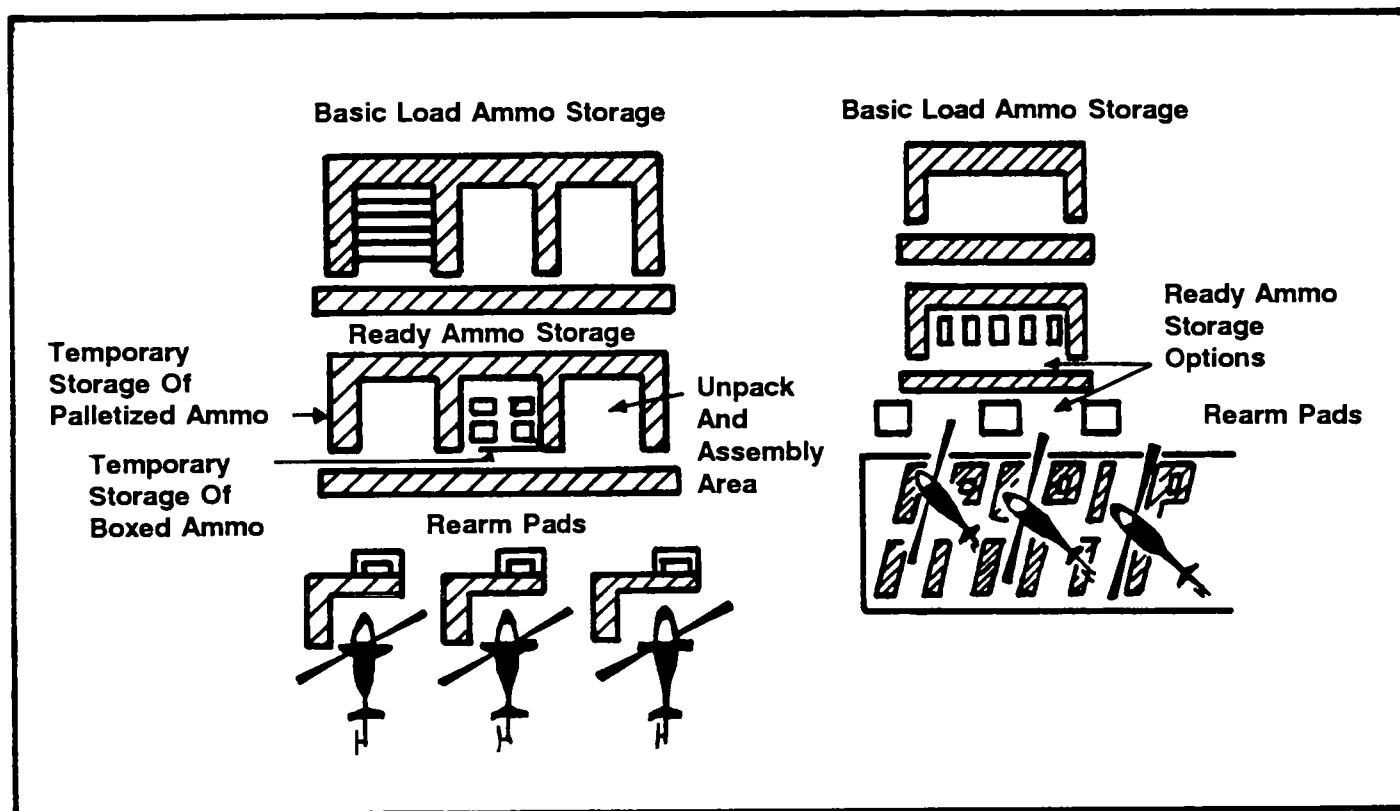


Figure 3-5. Two typical layouts for helicopter rearm points

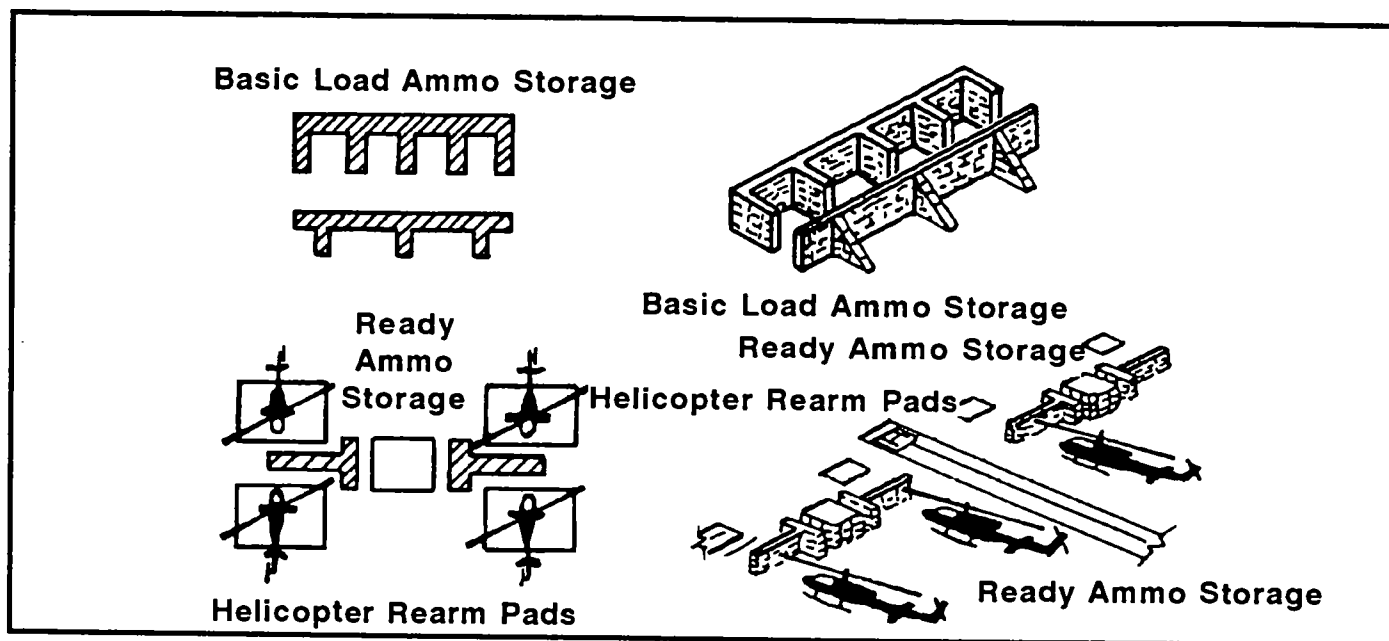


Figure 3-6. Three-dimensional view of a plan for a helicopter rearm point

3-18. PERSONNEL REQUIREMENTS

The weight of the ammunition containers and Hellfire missiles requires that two people load the aircraft weapon systems. When a full complement of ammunition types is required, the safest approach is to load the turret weapon system first, followed by the inboard wing stores. Appendix G shows the authorized armament configurations for the AH-series and OH-58 aircraft. Arming instructions are in the appropriate aircraft operator's manual.

3-19. SIMULTANEOUS ARMING AND REFUELING

a. Minimizing aircraft ground time in the FARP is important for two reasons. The first reason is that aircraft are extremely vulnerable on the ground. The second reason is that the longer it takes to service aircraft, the less time they are on the battlefield. Simultaneous arming and refueling minimizes ground time. However, simultaneous rearming and refueling is risky and the aviation commander must ensure that his personnel receive training to accomplish the tasks. This SOP requirement must be a well-rehearsed team effort.

b. Arming the weapon systems is most efficiently accomplished in a specific sequence. Initially, the weapon systems must be safed, starting with the outboard weapon systems and moving inboard. The system is left on and a stray current check is conducted on the rocket pod. The turret weapon system and the wing stores opposite the refueling port are the only weapon systems that should be armed while the aircraft is being refueled. Once the refueling is completed, the inboard weapon systems are loaded, followed by the outboard weapon systems on the refueling port side of the aircraft. The necessary maintenance equipment must be brought to the FARP to maintain the weapon systems. For example, materials for cleaning weapons, oils for lubricating weapons, tools for removing hung rockets, and a multimeter for conducting stray current checks should be available.

c. When planning the number of rearm and refuel points for a FARP, the platoon leader should consider how aircraft armament problems will be addressed. For example, one aircraft with a maintenance problem can tie up a refueling and rearming pad and degrade the FARP operation. An example of a simultaneous rearming and refueling FARP layout is shown in Figure 2-2.

CAUTION

Weapon systems should be safed and cleared before the aircraft is refueled.

Section V. Aircraft Flow and Mix

3-20. LIMITATIONS

a. A successful FARP operation is characterized by rapid turnaround times. However, several factors can degrade efficiency and increase turnaround times. These factors include crew size, night operations, NBC environment, weapons and ordnance mix, attrition, and maintenance problems.

b. Rapid turnaround times cannot be accomplished unless enough personnel are available to service the mission aircraft. Separating the available personnel and equipment into more than one FARP requires careful planning. During the day, under ideal conditions, a well-trained crew of two can fully arm the AH-64 aircraft in about 40 minutes. The AH-1 can be armed in 30 minutes. However, a crew of four can improve these times by 3 to 6 minutes.

c. Personnel shortages may require members of the aircrew to assist in arming and refueling. At least two people are needed to load the turret ammunition and TOW and Hellfire missiles.

d. When arming turret weapons at night, personnel will need night vision devices or supplemental lighting such as flashlights. Also, arming times will be three to eight minutes longer at night, especially under low light conditions.

e. The wearing of chemical protective clothing will increase refueling times by two to four minutes and rearming times by two to six minutes. Fatigue increases the longer a soldier remains under MOPP conditions. Personnel must remember to drink more water when in MOPP to reduce the possibility of heat injuries.

f. Weapons and ordnance mix could be a limiting factor. For example, an AH-64 may have a weapons load of two Hellfire missile launchers and two 19-tube rocket launchers. A mission change may require that AH-64s be set up for Hellfire heavy (four Hellfire missile launchers). The two 19-tube rocket launchers would then have to be removed and replaced with Hellfire missile launchers. The equipment and tools to accomplish this must be at the FARP. In addition, the launchers may have to be boresighted, which requires special equipment. Therefore, this time-consuming changeover must be in the commander's mission-support decision matrix.

g. Aircraft with armament maintenance problems may interrupt the flow of FARP operations. These aircraft should be positioned away from the arming and refueling area to keep the aircraft flow constant.

3-21. AIRCRAFT MIX

As a planning guide, refueling points should number half as many as there are aircraft in the troop, company, or platoon using the FARP. For example, there should be at least two refueling points to support the 2:2 mix. The FARP site should be large enough to set up two separate arming points to maintain attack section integrity during arming and refueling. The order in which sections are serviced is not important. However, the attack team that returns to the FARP with the least unexpended ammunition should perform an overwatch while other aircraft refuel and rearm.

Section VI. Training

3-22. QUALIFICATION TRAINING

Mission success depends on the ability of FARP personnel to set up and provide responsive arming and refueling services rapidly. Ammunition specialists (MOS 55B) receive no aviation training; Class V does not require special handling. Aircraft armament/missile system repairers (MOS 68J) receive 28 hours of hands-on training in arming and troubleshooting weapon systems. The different arming configurations of aircraft require armament personnel to be trained in the handling, loading, and arming of all armament systems. Armament technical manuals show the training levels for 68J personnel. Because of the dangers of arming "hot" aircraft, the commander must ensure that all 55B personnel are thoroughly trained in handling ammunition before they attempt such operations. Petroleum specialists (MOS 77F) receive 32 hours of hands-on training and testing in refueling aviation systems.

3-23. TRAINING REALISM

a. The training program must be as realistic as possible. All facets of the FARP's operation--from site preparation to rapid displacement--must be practiced and conducted under every combat-like condition. FARP personnel should be trained to operate around the clock and under varying levels of MOPP.

b. Commanders must provide soldiers with the quality of training required to do their jobs. Realistic training benefits the commander as well as FARP personnel. The commander will know from observing the training how long rearming really takes, and he can then plan accordingly. In addition, realistic training can surface problems that may have been ignored otherwise. For example, attack helicopter units have vehicles and aircraft with limited personnel- and equipment-carrying capacities. These kinds of problems can hinder the efficiency of the FARP.

3-24. OPERATION SKILLS

a. A successful FARP operation is the final product of a series of progressive skill-building programs to include the cross-training of assigned and attached personnel. Coordinated operations are achieved by integrating team training with programs that emphasize personal skill development. Training progresses as individuals are integrated into operational teams.

b. The commander must evaluate the FARP team's ability to deploy and operate. Weak areas will require specific training to bring the operation up to the required standards. The

evaluation process should be continuous so that the capabilities and limitations of the FARP are known. Therefore, a training program should be developed to meet specific unit needs.

c. An annual FARP contest can challenge soldiers as they train. Personnel and assets can be split into separate FARP groups. The contest could be a timed event in which soldiers drive into the proposed FARP location, set up the equipment, and refuel and rearm an aircraft.

3-25. INDIVIDUAL AND COLLECTIVE TRAINING

a. FARP operations will be successful when all FARP personnel are trained to operate as a team. Individual and collective training should not be limited to just arming and refueling activities. All FARP personnel should be trained in firefighting and rescue procedures in accordance with FM 10-68. Also, FARP personnel should be trained in receiving and preparing Class III/V helicopter external sling loads. FM 55-450-3 describes the procedures for sling load training.

b. Every team member should be proficient in day and night land navigation. Because night relocation of the FARP is common, night land navigation skills should be emphasized.

c. Team members should have extensive driver training and know how to accomplish operator maintenance procedures using the appropriate vehicle operator's manual. Delivering the product to the FARP is just as important as operating the FARP. Team members must also be able to check fuel quality using the visual sample, Aqua Glo, and American Petroleum Institute gravity-testing methods.

d. Team members should be trained in NBC detection and decontamination. This training will reemphasize FARP vulnerability to NBC attack and stress the need for the FARP to survive on the battlefield.

e. Personnel must be able to recognize any aircraft that may use the FARP. They should be able to identify all Army, Navy, Air Force, Marine, and NATO aircraft and know the proper refuel and rearm procedures for each aircraft.

f. Personnel should be proficient in self-aid and buddy-aid procedures. They also should be familiar with medical evacuation request procedures. FMs 21-11 and 8-10-6 provide information on these procedures.

g. Team members must receive standardized night vision device training as required.

3-26. ARTEP EVALUATION

ARTEP 1-100-30-MTP contains the task and mission requirements for the Class III/V section. These requirements are to conduct FARP operations; relocate the FARP; request, receive, and store ammunition and fuel; and conduct forward refueling. The unit training program should be tailored so that the Class III/V sections can successfully accomplish the ARTEP tasks.

CHAPTER 4

COMBAT SUPPORT

The aviation unit commander occasionally uses combat support elements from the brigade in whose sector the unit operates. Combat support assets include air defense, field artillery, intelligence, and engineers. This chapter discusses the combat support roles of these assets in helping the FARP accomplish its mission.

4-1. AIR DEFENSE

a. **Planning.** The commander's AD plan includes his priorities for air defense within his area of operations. If the unit is augmented with attached AD assets, the senior air defense officer or NCO will advise the commander on their use. The commander will analyze the terrain, probable intensity and types of enemy aircraft expected, and threat against the available AD weapons supporting his unit. Based on the commander's priorities, the air defense officer and the S3 allocate specific AD weapons and designate the positions that the weapons will occupy. The S3 continues to coordinate and supervise the activities of the supporting air defense force throughout the operation.

b. **Enemy Detection.**

(1) FARPs and helicopters on the ground can be acquired in several ways. The simplest scenario is direct observation by an armed aircraft, followed immediately by an attack. In this case, the FARP would be a target of opportunity for an aircraft on some other specified mission. A sophisticated scenario may involve a specific sequence of events: the enemy acquires a cuing signal, confirms the target, develops an attack plan, and executes the attack. Another example may involve direct observation of the FARP by enemy ground forces, followed by artillery or other ground-based fires or air-delivered fires.

(2) FARPs that remain in place for an extended period will produce communication signatures and thermal images from aircraft and fuel storage bladders. These may enable the enemy to detect the FARP and launch an attack against it. The enemy can acquire FARPs by any of the following means:

- Radar.
- Television.

- Infrared detectors.
- Infrared surveillance.
- Visual (unaided or aided).
- Satellite and other photography.
- Human intelligence (visual and acoustic).
- Air and ground electronic surveillance.

4-2. DEFENSIVE MEASURES

The FARP must be protected against targeting by enemy air assets. This can be accomplished by using both active and passive air defense measures.

a. Active Defense Measures. The FARP has a limited organic AD capability. The firepower of the FARP includes M2 and M60 machine guns and other small arms. These weapons can make a difference during an air attack. Small arms fire may not destroy attacking enemy aircraft; however, they may distract pilots long enough for them to miss their target. FM 44-8 explains the use of small arms in the air defense role.

b. Passive Defense Measures. Passive defense measures are a cost effective and timely way to protect FARP assets. Four primary objectives are associated with the passive defense mission. They are tactical warning, susceptibility reduction, vulnerability reduction, and reconstitution and recovery of FARP operations.

(1) **Tactical warning.** Tactical warning is a trigger event for the employment of passive defense measures. Commanders must thoroughly understand the attack warnings and respond quickly so that friendly forces will have time to protect themselves from the attack and aviation capabilities will not be degraded.

(2) **Susceptibility reduction.**

(a) **Camouflage.** Camouflage is important to prevent detection of the FARP. Camouflage netting should be used when possible; however, its use may interfere with the rapid displacement capability of the FARP. FM 20-3 contains more information about camouflage.

(b) **Concealment.** FARP positions should be selected that offer natural cover and concealment. Cover should be placed on the windshields and headlights of vehicles and on the canopies of aircraft. Vehicles and equipment should be placed under trees, brush, and hedgerows or parallel to the tree line and in the shadow of trees. When shadows are used as a concealment aid, vehicles and equipment may have to be repositioned during the day to remain shadowed. Figure 4-1 shows a tactical FARP layout. In this case, ammunition resupply operations are conducted after refueling operations at a location where munition malfunctions will not cause damage or injury to friendly forces. This also maintains the required camouflage and dispersion and provides some security during FARP operations.

(c) **Emission control.** Communications must be kept to a minimum. Aircrews should be familiar with and use approved approach and departure procedures. The operation of any power equipment, such as pumps, should be delayed until the last possible moment. This will reduce the chance of infrared and acoustical signature cues being observed by the enemy.

(d) **Emplacement procedures.** During the setup of the FARP, vehicle movement should be kept to a minimum to reduce the number of tracks made through the grass and dirt. Another visual signature cue is the "straight line" configuration of the FARP hoses. The hoses should be configured in a curved pattern, as is shown in Figure 4-1.

(e) **Urban emplacement.** Tactical considerations may require emplacement of the FARP in an urban area. This will present both hazards and opportunities. Hazards include wires and antennas and exposure to terrorists and man-portable air defense weapons. Opportunities include many places to hide a FARP. Equipment and supplies can be hidden in or around buildings. The buildings also can mask aircraft movement. The road network in an urban area should not be used for vehicle movement and resupply because vehicular activity may reveal the location of the FARP. Resupply vehicles should pick alternate routes to the urban FARP. In some cases, a driver may deceive observers by driving by the FARP only to return to it from another direction. Figure 4-2 on page 4-5 shows how a FARP might be set up in a built-up area.

(f) **Security.** Ground security measures begin with the advance party. The advance party should start local security actions immediately. Paragraph 3-4 provides more information about security at the FARP.

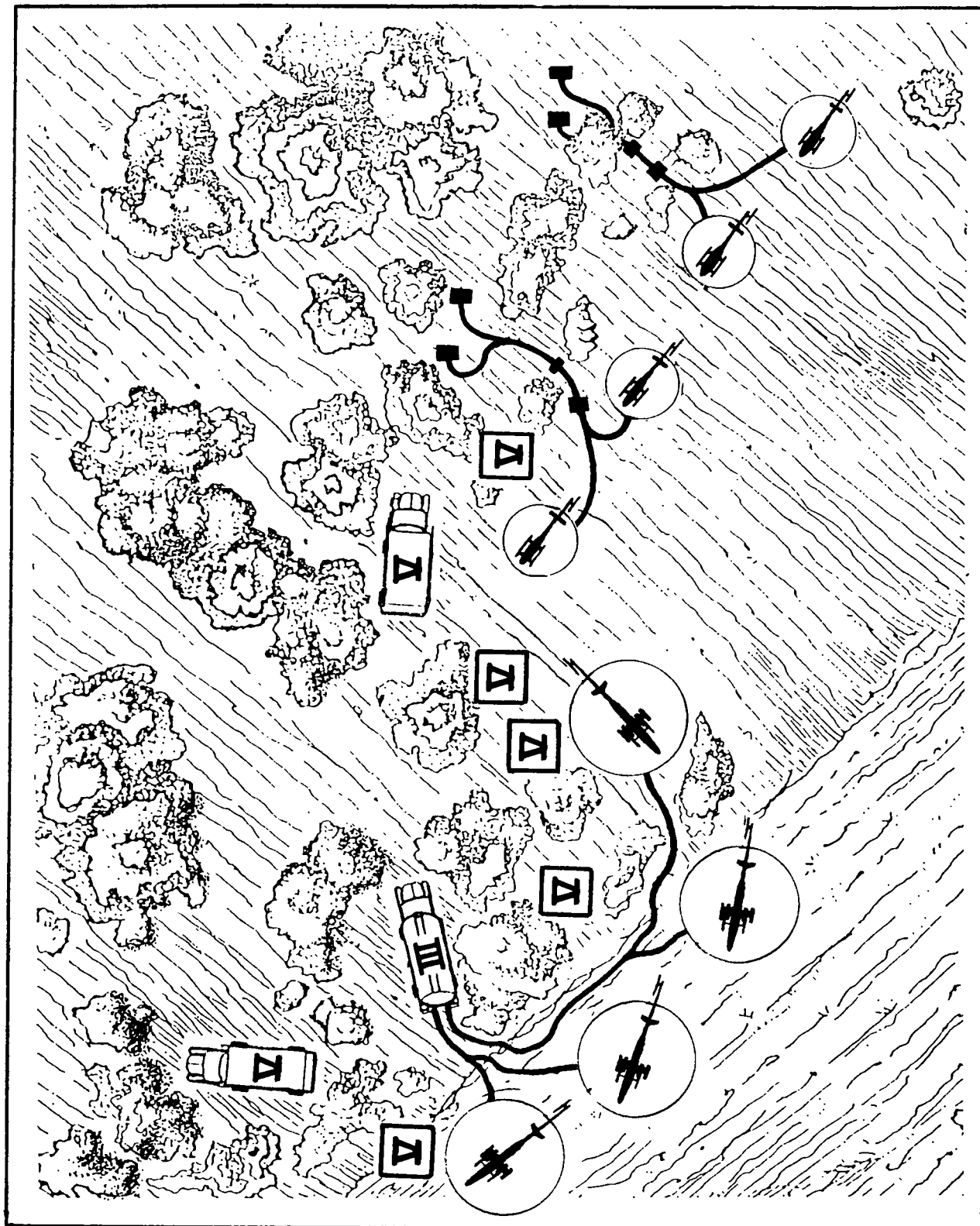


Figure 4-1. Tactical FARP layout

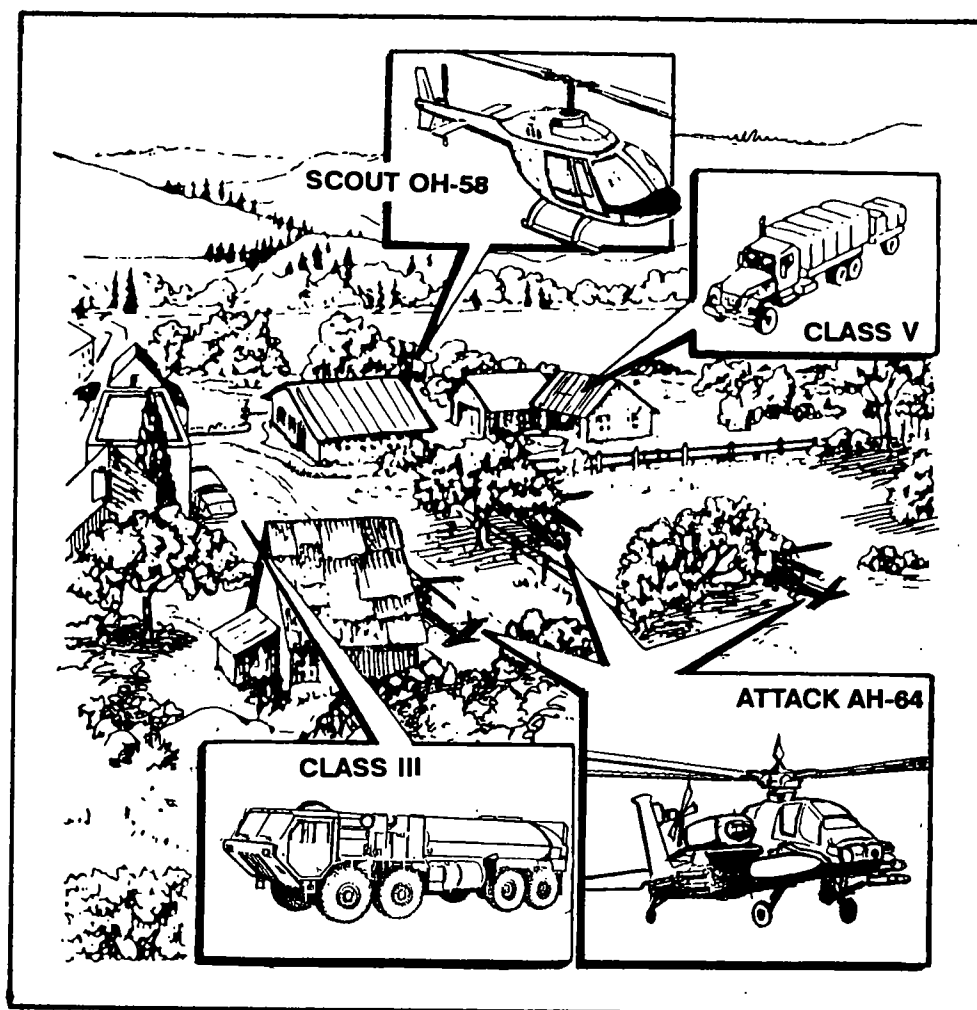


Figure 4-2. FARP operations in urban terrain

(g) **Mobility.** The FARP, by the nature of its mission, is a highly mobile asset. Proper emplacement of the FARP facilitates expedient completion of the mission and rapid preparation for movement.

(h) **Deception.** The enemy understands the importance of FARPs and will be looking for them. Deception misleads the enemy by manipulating, distorting, or falsifying friendly actions, causing the enemy to deplete its resources by attacking false targets and missing intended targets. Dummy FARPs using decoy fuel equipment, ammunition, and aircraft may divert attention from the real FARPs.

(3) Vulnerability reduction.

(a) **Hardening.** Hardening reduces the effects of any attack on FARP assets. FARP vulnerability to attack may be reduced by careful site selection, field fortification, and other field-expedient methods.

(b) **Redundancy.** When possible, additional FARP assets should be deployed. In some cases, this may only be spare parts such as a backup pump for the jump FARP.

(c) **Dispersion.** When the terrain is not suitable for concealment, commanders can disperse their assets so that the unit presents a less lucrative target. Varying the pattern of unit deployment avoids stereotypical patterns that allow the threat to identify the type of aviation unit being observed.

(4) Reconstitution and recovery.

(a) Following an attack, units must be restored to a desired level of combat effectiveness commensurate with mission requirements and available resources. Reconstitution may include reestablishing or reinforcing command and control; reallocating or replacing personnel, supplies, and equipment; conducting essential training; reestablishing unit cohesion; and repairing battle damage.

(b) Several passive defense measures can be used at the FARP with very little logistic burden. These measures are designed to enhance FARP survivability during all phases of operation. A FARP checklist is provided at Appendix F.

4-3. FIELD ARTILLERY

a. Support Relationship. The aviation battalion receives its artillery fire support from the unit that is providing direct or reinforcing support. The commander of the aviation battalion and the FSO work together to integrate the firepower of field artillery; close air support; and, when available, naval gunfire to defeat the enemy. The FSO assists the commander by developing the fire support plan concurrently with the maneuver plan. During the battle, the FSO and the fire support sergeant monitor the execution of fire support to ensure compliance with the commander's intent and to provide continuous support.

b. Fire Support Planning.

(1) The planning process specifies how fire support will be used and what type, when, and with what means targets will be attacked. The fire support plan contains information on how fire

support will be used during an operation. Simple fire support plans may be in the OPORD. If the operation requires lengthy or detailed plans, then a fire support annex to the OPORD may be prepared. The fire support annex amplifies the instructions in the fire support plan. Specific support plans for each type of fire support (for example, field artillery support, air support, and chemical support plans) are prepared as necessary to amplify the fire support plan. The plan must be flexible so that personnel can respond to the unexpected in combat.

(2) The aviation battalion S3 designates the locations of the FARPs. He should provide the FSO these locations along with the projected movement time to the locations so that the FSO can plan a schedule of fires to protect the FARP. In addition, FARP leaders must know the locations of the supporting artillery battery to plan routes to and from the FARP that provide safety for aircraft and facilitate support by field artillery. FARP personnel need to know the fire support plan so that they will know whom to call for fire on a target while they are in the FARP or while they are en route to another location.

4-4. INTELLIGENCE

a. Intelligence Uses.

(1) To defeat the enemy, the aviation commander must "see" the battlefield better than his opponent. He must know as much as possible about the enemy, weather, and terrain. This intelligence helps the commander make decisions, issue orders, and successfully employ his forces on the battlefield. It also helps the commander determine the best locations for his FARPs. Appendix H shows the critical elements that must be considered during FARP planning.

(2) The Class III/V platoon leader must keep abreast of the intelligence situation so that he can anticipate and plan for future FARP operations. Armed with up-to-date intelligence, the platoon leader can help the S3 determine how to best support the mission. Current knowledge of the enemy will help the Class III/V platoon leader avoid threat targeting of the FARP through sensor weapons.

b. Intelligence Collection. The commander obtains information about the battlefield from higher headquarters. He supplements this information with reconnaissance. The S2 is the intelligence coordinator for the battalion. He collects, processes, and interprets information from subordinate units. The S2 passes this information to higher headquarters where it is consolidated with intelligence information from other sources and passed to the G2 at division.

c. Intelligence Dissemination.

(1) The G2 disseminates the results of the collection effort as intelligence summaries. These provide an intelligence update for the units in the division. The S2 obtains and disseminates weather information for the planning considerations of subordinate units. The S2 also provides the S3 with the current threat situation, which the S3 uses when he coordinates with the air liaison officer to suppress enemy air defense systems.

(2) Intelligence collection requirements are distributed in terms of essential elements of information and other intelligence requirements. Based on the mission, command guidance, and available intelligence, the S2 develops an intelligence course of action in accordance with the needs of the battalion and higher headquarters. If the commander approves the course of action, orders and requests are issued to collect information for intelligence production.

4-5. ENGINEERS

Engineer operations require considerable time and labor. Therefore, engineer support may not be realistic because of the shortage of engineer assets, number of tasks to be performed, and short duration of the FARP at one location. However, if the FARP is located in a relatively secure area, such as an airhead, engineer assets could be useful. If engineer assets are available, they can increase the mobility, countermobility, survivability, and sustainment of the FARP. Engineer support is requested through the engineer staff officer at the brigade responsible for the sector where the FARP will be located. The engineer staff officer will recommend changes about the priority of engineer support to the brigade commander.

a. Mobility. Engineers can increase the mobility of the FARP by--

- Constructing FARP sites.
- Constructing combat roads and trails into and out of FARPs.
- Spraying dust suppressant in desert areas.
- Clearing rubble for the passage of vehicles and aircraft (ground handling) in built-up areas.
- Removing trees and other obstacles to flight along routes into and out of the FARP to help aircraft avoid being silhouetted.

b. Counter mobility. Engineers can increase the capabilities of the FARP by--

- Emplacing mines around fuel and ammunition caches.
- Emplacing minefields to fix or turn enemy vehicles away from the FARP.
- Constructing other obstacles near the FARP to delay, disrupt, turn, or block the enemy.

c. Survivability. Engineers can increase the survivability of the FARP by--

- Preparing buildings to house FARP equipment (HEMTT tanker or FARE).
- Constructing protective positions for fuel and ammunition vehicles in FARPs.
- Constructing protective positions for collapsible fuel drums and palletized ammunition.

d. Sustainment. Engineers can increase the sustainment of the FARP by--

- Maintaining and/or improving combat roads and trails into and out of FARPs.
- Clearing minefields and removing other obstacles.
- Maintaining and/or improving protective positions.



CHAPTER 5

COMBAT SERVICE SUPPORT

FARP operations require close staff coordination. The battalion staff must anticipate and coordinate the unit's Class III/V needs with higher echelons. The aviation brigade must coordinate and rely on support from the division or corps support command. This chapter discusses Class III/V considerations, resupply, and requirements. It also discusses argon gas, transportation planning, rear operations, and nonlinear battlefield operations.

5-1. CONSIDERATIONS

a. FARP support missions depend on the unit mission, time, ammunition mix, and bulk packaging handling requirements. The unit mission specifies the Class III/V operations of the FARP. The type of unit and its organic aircraft weapon systems define mission Class V requirements. For example, a FARP supporting an attack helicopter unit would require more TOW and Hellfire missiles than a FARP supporting an air cavalry unit. The cavalry mission may require more suppressive ammunition such as the Hydra-70. The Class V requirements of a cargo or utility unit will be limited to small arms ammunition.

b. The planned time of the mission also must be considered when the support mission of the FARP is defined. For example, the AH-64 has an around-the-clock operational capability. Therefore, ordnance load should be the same regardless of the time frame of the mission. On the other hand, the AH-1 has a limited night-fighting capability. Firing TOWs at night will require illumination rockets. AH-1 night operations may need greater amounts of suppressive ordnance than normally used during the day.

c. As the ammunition mix changes to support the mission, so do the FARP's bulk packaging and materiel-handling requirements. Transportation and materiel-handling requirements may exceed the capabilities of equipment and personnel. Transport vehicles may exceed their cargo-carrying capacity (cube out) before exceeding their weight limitations. Table 5-1 shows the cargo capacities for various types of vehicles. Ammunition is unloaded using available materiel-handling equipment. This may be the TOE-authorized forklift or the HEMTT-mounted crane. Transporting the variable reach forklift may require a flatbed trailer, an item not readily available to the unit. When either the forklift or

the crane is unavailable or unserviceable, ammunition pallets must be manually broken down while on the bed of the transport vehicle. This can be a laborious and time-consuming operation.

Table 5-1. Cargo capacity comparison

MUNITION	HEMTT (Rounds)	HEMAT (Rounds)	5-TON TRUCK		1 1/2-TON TRAILER (Rounds)
			SHORT BED (Rounds)	LONG BED (Rounds)	
Hellfire	36	36	27	45	9
TOW	84	72	60	96	24
Stinger	54	54	36	54	9
Hydra-70	240	240	180	300	60
20-mm	19,200	19,200	9,600	9,600	2,400
30-mm	10,368	10,368	10,560	10,560	2,640

5-2. RESUPPLY

a. Resupply operations must keep pace with the tempo of the battle. However, resupply is best accomplished during lulls in combat or when vehicles can be protected from enemy observation and indirect fires. Resupply actions should start as soon as the operation permits. These actions are affected by unit resupply time and capability, current situation, expected usage rates, and/or mission changes.

b. Periodic status reports on bulk POL are processed through the unit S4 and then sent to the division materiel management center to forecast user needs. The request for POL will be submitted 72 hours in advance of the required delivery time. Bulk Class III is provided by elements of the corps petroleum supply battalion in the CSA. An emergency reserve of Class III is maintained at the division main Class III supply point in the DSA. The corps delivers Class III supplies, using throughput distribution, as far forward as the BSA. However, the supplies may be delivered farther to the combat trains (FARP) in specific situations. The aviation unit will use its vehicles to transport the fuel from the transfer point to the FARP. The Class III transfer points should be located with the division main Class III point and the BSA Class III transfer point. Aviation units

in the corps rear area will receive Class III from the CSA transfer point. Two methods are used to distribute Class III: unit distribution and supply point distribution.

(1) **Unit distribution.** This is the method used when the issuing agency delivers supplies to the receiving unit. Through-put distribution is a type of unit distribution used by the corps to deliver Class III. Unit distribution is the preferred method of distribution, and it is normally the method associated with getting supplies to the BSA.

(2) **Supply point distribution.** This is the method used when the receiving unit is issued Class III supplies at a distribution point. The unit moves the supplies with its organic transport vehicles.

c. If demand exceeds the unit's supply capabilities, limited aerial resupply may be available from other division or corps cargo and utility aircraft. During emergencies, the corps may deliver supplies as far forward as the battalion trains area; however, this will require extensive coordination. Figure 5-1 shows the flow of Class III supplies.

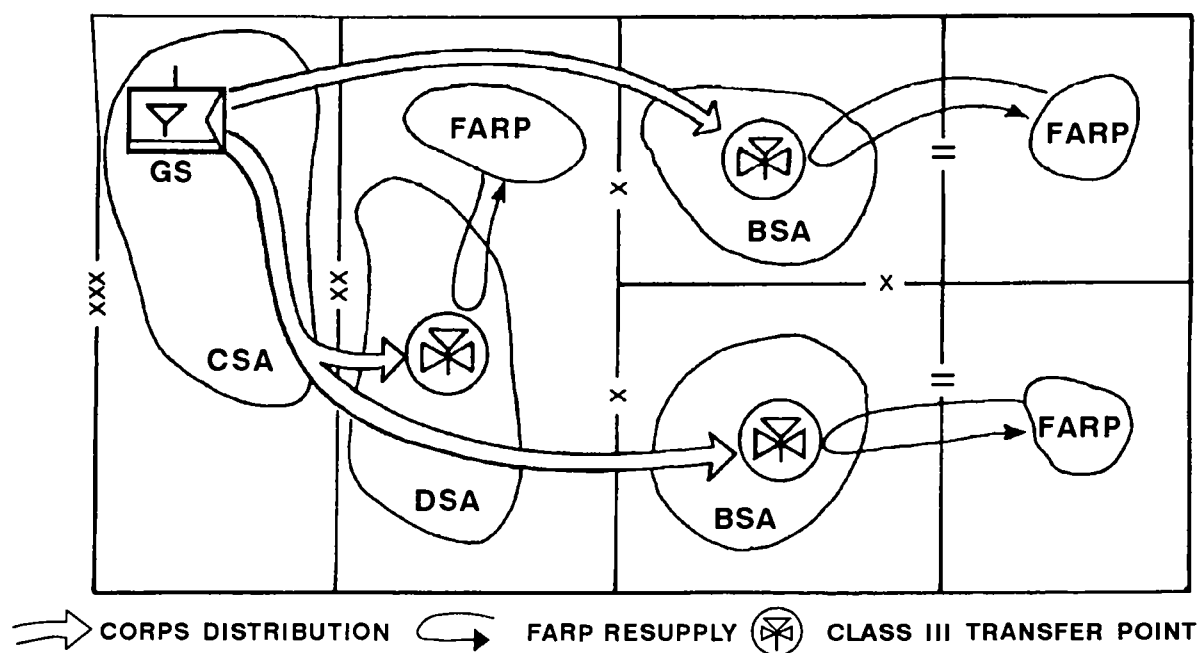


Figure 5-1. Flow of Class III supplies

d. Fuel is tested by the supplying unit. In addition, it also must be tested by the receiving unit. FMs 10-68 and 10-70 contain the procedures for sampling and testing fuel. POL products should not be transloaded between carriers if it can be avoided.

e. The battalion S4 normally uses DA Form 581 (Request for Issue and Turn-in of Ammunition) to request ammunition. The form is forwarded to the appropriate materiel management center or designated ATP representative. Once the request has been authenticated, the ammunition is issued by supply point distribution to the battalion or brigade Class III and V platoon trucks. This is accomplished either at the ATP or the corps ASP consistent with the controlled supply rate in effect.

f. Within the division, each forward support battalion can operate one ATP. The corps direct support ammunition company provides an additional ATP, which is located in the DSA. The ATPs normally are located in the BSA, and they contain high-tonnage, high-usage ammunition to support all the division units operating in the brigade area. The ammunition is transported to the ATP via throughput distribution from the corps on stake and platform trailers. It is then transferred to the battalion trucks or off-loaded for future transfer. All other ammunition is kept in the ASP in the CSA; this area is normally located directly behind the rear of the division area. Figure 5-2 shows the flow of Class V supplies.

5-3. CLASS III REQUIREMENTS

a. Two factors determine the amount of fuel required in the FARP. The first is the total number of aircraft to be supported. For planning purposes, 100 percent availability must be assumed. This will provide fuel for unplanned aircraft that may need support. The second and probably the most important factor is the expected duration of the mission. The mission fuel requirement can then be calculated as follows: mission duration x number of aircraft x fuel consumption in GPH. Table 5-2 shows the fuel consumption rates for helicopters that may need fuel in the FARP. SB 710-2 contains more information about fuel consumption rates.

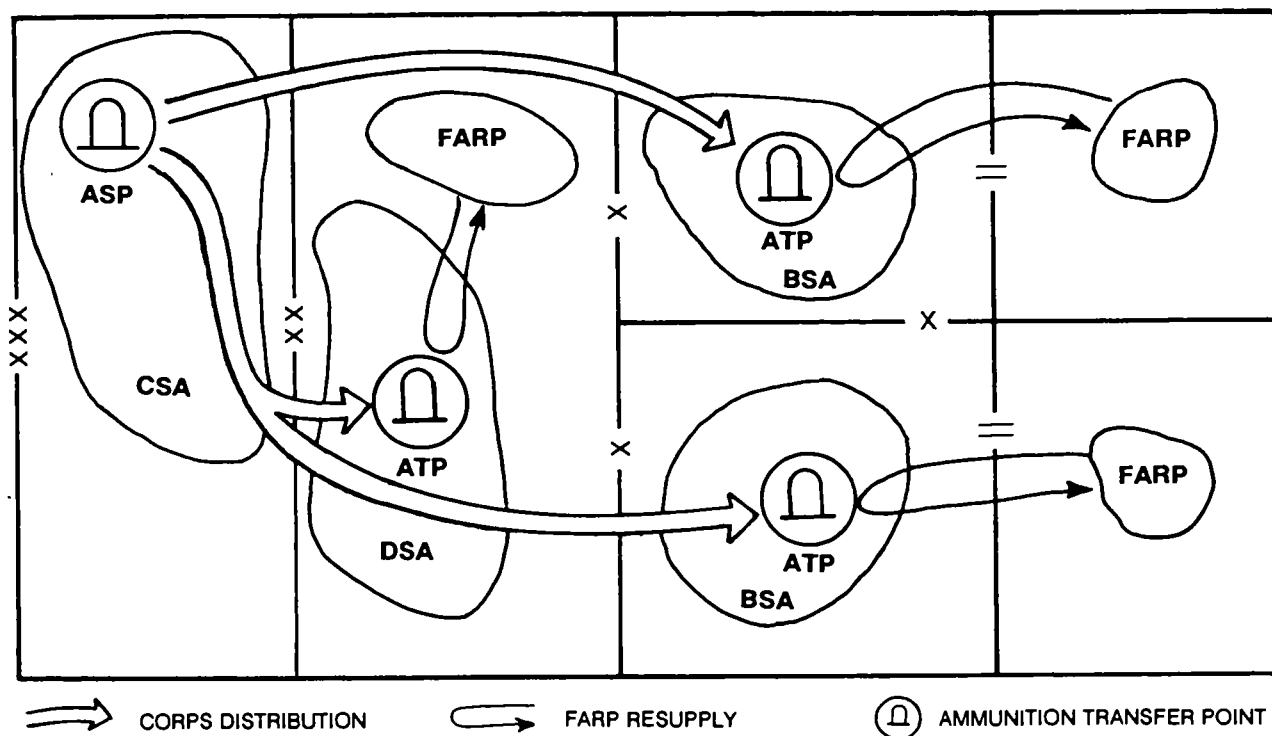


Figure 5-2. Flow of Class V supplies

Table 5-2. Fuel consumption rates

HELICOPTER	CAPACITY (In Gallons)	CONSUMPTION RATE (Gallons per Hour)	
		JP4	JP8
AH-64	370	173.40	178.94
AH-1S	262	109.80	113.31
CH-47C/D	1,030	447.10/506.60	461.38/522.78
OH-58C	72	26.80	27.66
OH-58D	112	43.90	45.30
OH-58D (Armed)	112	107.80	111.24
UH-1H	209	88.80	91.64
UH-60	362	175.40	181.00

b. The example below shows how to calculate the mission's Class III (JP8) requirement for an L-series AH-64 attack helicopter battalion. The mission is expected to last three hours.

3 hours x 3 (UH-60) x 181 GPH	=	1,629 gallons
3 hours x 13 (OH-58D) x 45 GPH	=	1,755 gallons
3 hours x 18 (AH-64) x 179 GPH	=	<u>9,666</u> gallons
Total	=	17,705 gallons

c. Once the fuel requirements have been calculated, the transportation assets needed to move that fuel can be determined. The example in **b** above assumes that the Class III/V platoon of an attack helicopter battalion has seven mission-capable HEMTT tankers, as authorized on the TOE. Because each HEMTT tanker holds 2,500 gallons of fuel, eight HEMTT tankers would be required to support the battalion.

NOTE: Fuel capacities for HEMTT tankers will vary because of operational and environmental conditions. FMs 10-68, 10-69, and 10-71 contain information on these conditions.

d. If fuel shortages occur during the mission, the turn-around times to resupply points become a critical planning factor. If supplies are flown in, planning may include support for those CH-47s or UH-60s carrying supplies.

5-4. CLASS V REQUIREMENTS

a. The battalion S4 is responsible for calculating the amount of ammunition needed for the mission. He bases his figures on the S3's plan and uses FMs 101-10-1/1 and 101-10-1/2. Table 5-3 shows an example of the total Class V requirements needed by an attack helicopter battalion for one day. These figures can be used to calculate how much transportation will be required.

Table 5-3. Munitions requirements for one day

AH-1 BATTALION		AH-64 BATTALION	
<u>Weapon</u>	<u>Rounds</u>	<u>Weapon</u>	<u>Rounds</u>
TOW	336	Hellfire	576
Hydra-70	1,512	Hydra-70	1,512
20-mm	36,750	30-mm	36,000

b. The approximate number of vehicles needed to transport the Class V products can be calculated using Table 5-1, which is shown on page 5-2. The example assumes that the Class III/V platoon in an attack helicopter battalion has six mission-capable cargo HEMTTs, as authorized on the TOE. The AH-1 battalion will require seven HEMTTs to support the mission's Class V requirements. Therefore, one HEMTT will have to return to the battalion support area. On the other hand, seven HEMTTs with trailers are required to support the Hellfire needs of the AH-64 battalion. The 30-millimeter cannon would require one more HEMTT with trailer for a total of eight HEMTTs with trailers. The example illustrates that the Class V requirements exceed the transport capability of the unit and that thorough planning and prior coordination are needed to ensure that the Class V requirements at the FARP are met.

5-5. ARGON GAS

a. Three bottles of argon gas are required for the air-to-air Stinger launcher. The launcher is shown in Figure 5-3. Only one bottle of argon is used at one time. Current estimates indicate that one bottle of argon will be consumed every two hours in a training environment. In wartime, it is predicted that one bottle will be consumed for every two missiles fired. A three-day supply of argon must be stored in the basic loads. The bottles must be removed for recharging when--

- The pressure reads below 4,500 psi during preventive maintenance checks and services.
- An argon sensor message on the terminal display indicates a pressure of about 3,500 psi or less. (Bottles may be usable between 3,000 and 3,500 psi, depending on the outside temperature.)

b. Figure 5-4 on page 5-9 shows the components necessary to charge an argon bottle. They are briefly described below.

(1) Argon gas bottle. This bottle is used to store argon gas in the fire unit (launcher). It is 31.5 inches long and 3 inches in diameter. The weight of the bottle when full of argon gas is 10.5 pounds. Its capacity is 2 liters.

(2) Argon resupply cylinder. This is the argon source used to recharge the bottles. It is 51 inches long and 9.24 inches in diameter. The weight of the cylinder when full of argon gas is 378 pounds. Its capacity is 43.26 liters.

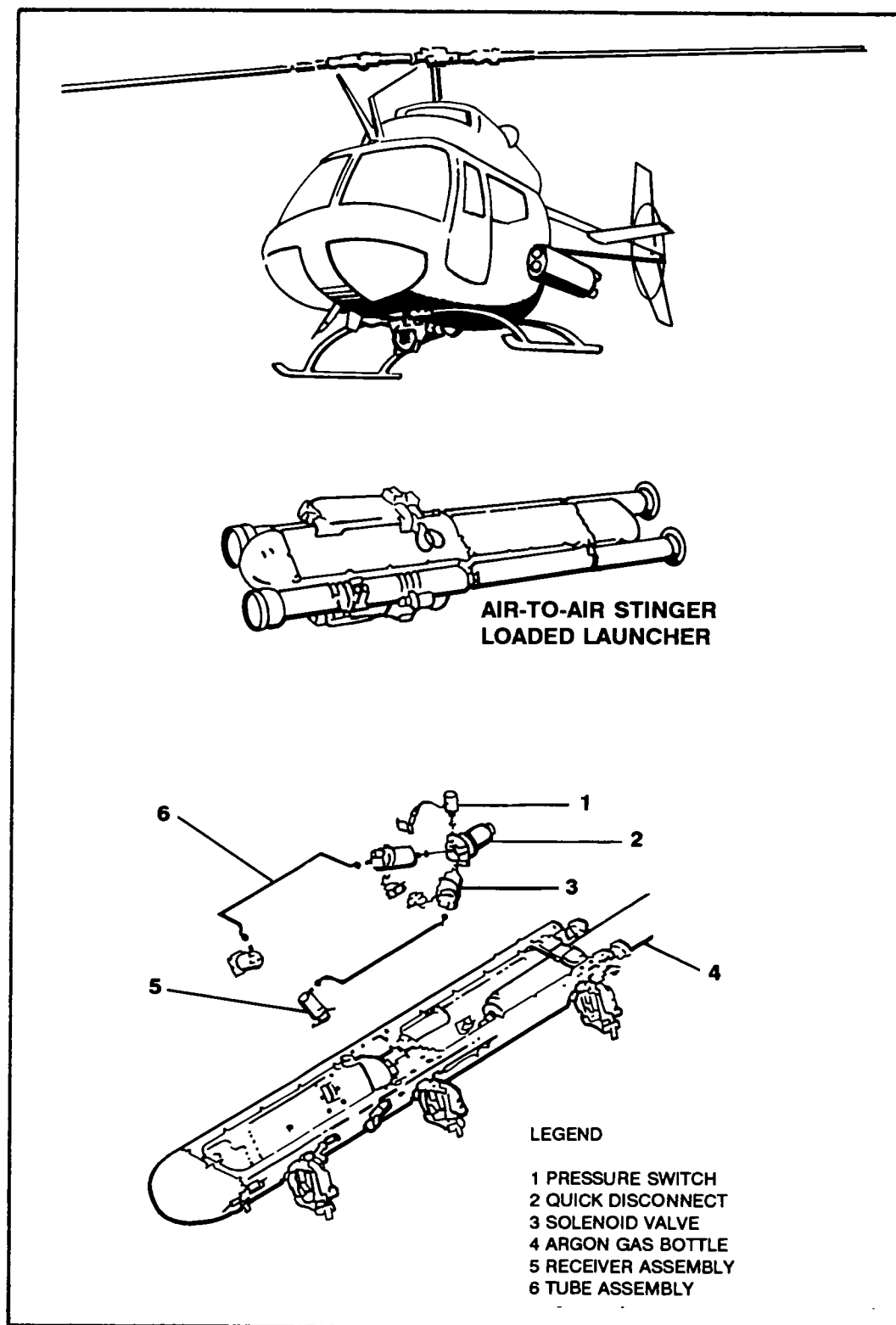
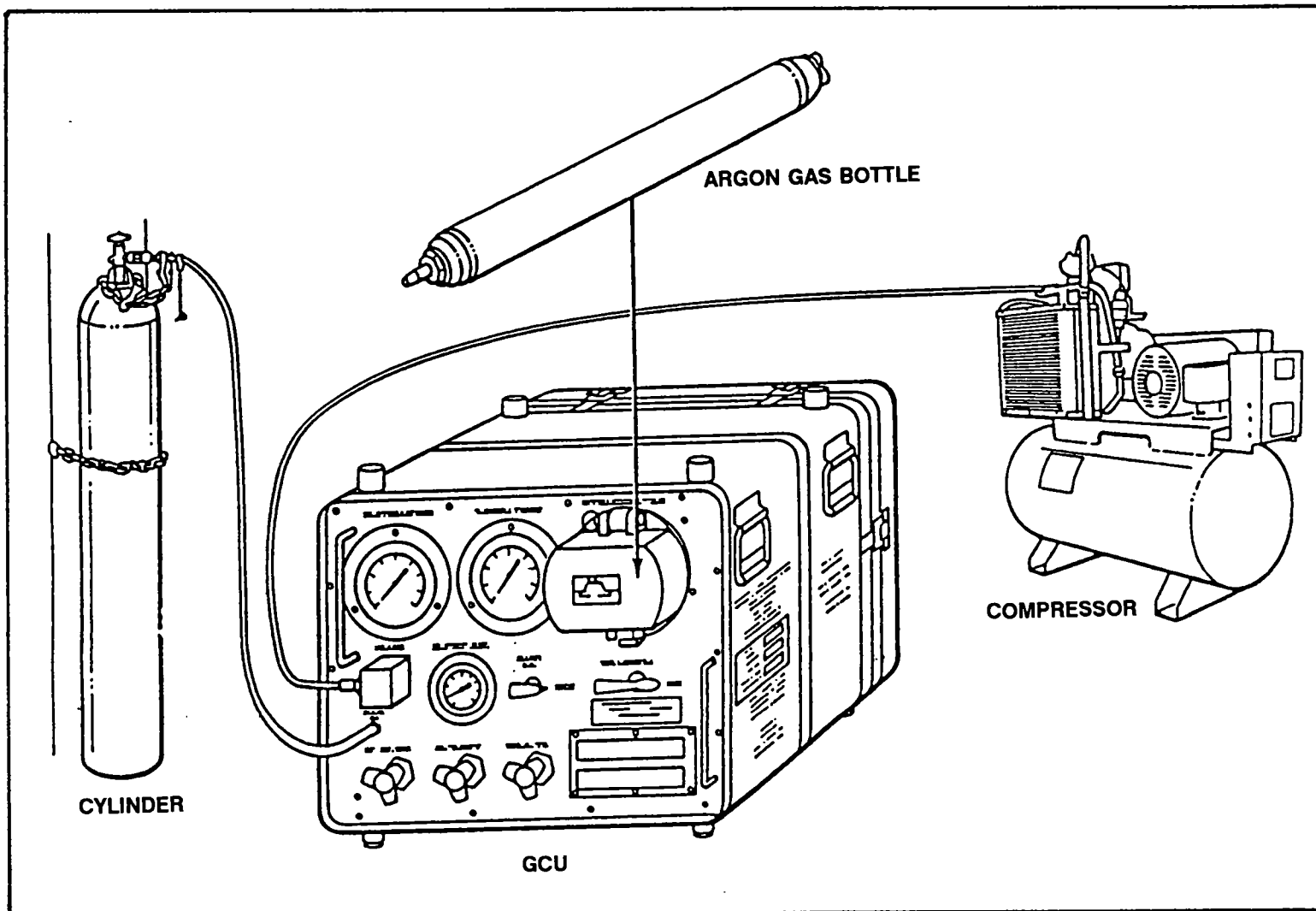


Figure 5-3. Air-to-air Stinger launcher

Figure 5-4. Basic charging system



(3) Gas charging unit. The GCU is the mechanism by which argon gas is transferred from the supply cylinder to the bottles at the requisite pressure. The GCU can provide 97 to 125 psi and be operated off the air brake of a tactical vehicle.

(4) Air compressor. An air compressor may also be used to power the GCU if the GCU can provide 97 to 125 psi.

c. Two GCU systems are assigned to the AVIM company. Empty bottles will be transported to the rear to be recharged. An additional GCU will be located at the ASP or ATP. When the 55B makes an ammunition resupply run, he can get the bottles recharged at the same time and location. Another option is to have a task-organized section from the AVIM company move forward to support the FARP.

5-6. TRANSPORTATION

a. Planning Considerations.

(1) When the demand is greater than the support capability, resupply turnaround times become critical considerations during the planning sequence. The distance between the FARP and the resupply point can directly affect continuous FARP operations. If it takes too long to get supplies, the unit's mission could be jeopardized because of a Class III or Class V shortage.

(2) The example in Table 5-4 illustrates how time critical the resupply effort is to the FARP, assuming that the corps does not deliver Class III/V products to an ATP by throughput distribution. The data in the table are based on the following assumptions:

- L-series TOE equipment.
- European environment (intense commitment).
- Primary roads: day 30 kph; night 16 kph.
- Secondary roads: day 21 kph; night 16 kph.
- Primary roads: 25 percent.
- Secondary roads: 75 percent.
- Distance between FARP and ASP: 30 to 50 kilometers.
- ASP service time: 1.0 hour (day) to 1.5 hours (night).

- Daytime speed: $.75 \times 21 \text{ kph} + .25 \times 30 \text{ kph} = 23.25 \text{ kph}$.
- Nighttime speed: $.75 \times 16 \text{ kph} + .25 \times 16 \text{ kph} = 16 \text{ kph}$.
- Round-trip travel times.

Table 5-4. Round-trip travel times

DISTANCE (Kilometers)	DAY (Hours)	NIGHT (Hours)
30	3.6	5.25
40	4.4	6.5
50	5.3	7.75

b. Planning Options. Several transportation options are available to the commander. They are briefly described below.

(1) All available unit vehicles can be used, not just the Class III/V platoon vehicles.

(2) FARP vehicles may have to pre-position Class III (collapsible drums) and Class V and then be sent immediately to the ASP or ATP for resupply.

(3) Utility or cargo aircraft may have to transport the shortfall to the FARP.

5-7. REAR OPERATIONS

The flexibility and mobility of today's helicopters provide a quick response capability to support rear operations. An attack unit may be employed on the FLOT and suddenly be told to fight at a location 50 to 100 kilometers away. In such situations, aircraft will have to react rapidly. Aircraft may have to return to unit FARPs for initial arming and refueling before supporting the rear battle mission. If time does not permit returning to the battalion FARPs, then Class III and V support must be obtained from other sources such as other unit supply points, ATPs, and ASPs. This assumes that these units have the nozzles to refuel the aircraft and the type of ammunition required. Also, fuel and ammunition may be available from other aviation units located between the FLOT and rear objective. As a last resort, fuel can be obtained from Class III distribution points. Ammunition will be available at corps ASPs and brigade ATPs. The aviation

brigade S4 is responsible for identifying and coordinating with friendly elements that can provide Class III/V support to aviation units. However, corps and division units that can provide Class III/V products are likely targets of deep attacks.

5-8. NONLINEAR BATTLEFIELD OPERATIONS

A nonlinear battlefield may have extremely long supply lines. To ease the Class III/V logistical problems, the FARP may be located and operated out of a fixed base or an airhead and rely on the throughput of assets from higher echelons. Locating the FARP at a fixed base or an airhead will give it more security from the effects of any drastic changes in the battle direction. If a FARP is located outside a fixed base, the distance between it and the BSA and the lack of secure routes may require air assets to accomplish the resupply mission.

5-9. AVIATION SUPPORT BATTALION

The aviation support battalion provides logistical support for the division aviation brigade. The headquarters and supply company is primarily concerned with sustainment operations. This company receives, temporarily stores, and issues bulk Class III. It also establishes and operates Class III (aviation fuel) transload sites in the BSA to resupply brigade operations. In addition, the ASB establishes and operates rear area helicopter refueling sites (DRRP) to support aviation brigade units. Using the BRRP, the ASB provides fuel to the command aviation and assault aviation companies. Figures 5-5 and 5-6 show the unit organization of the ASB in support of one or two attack helicopter battalions.

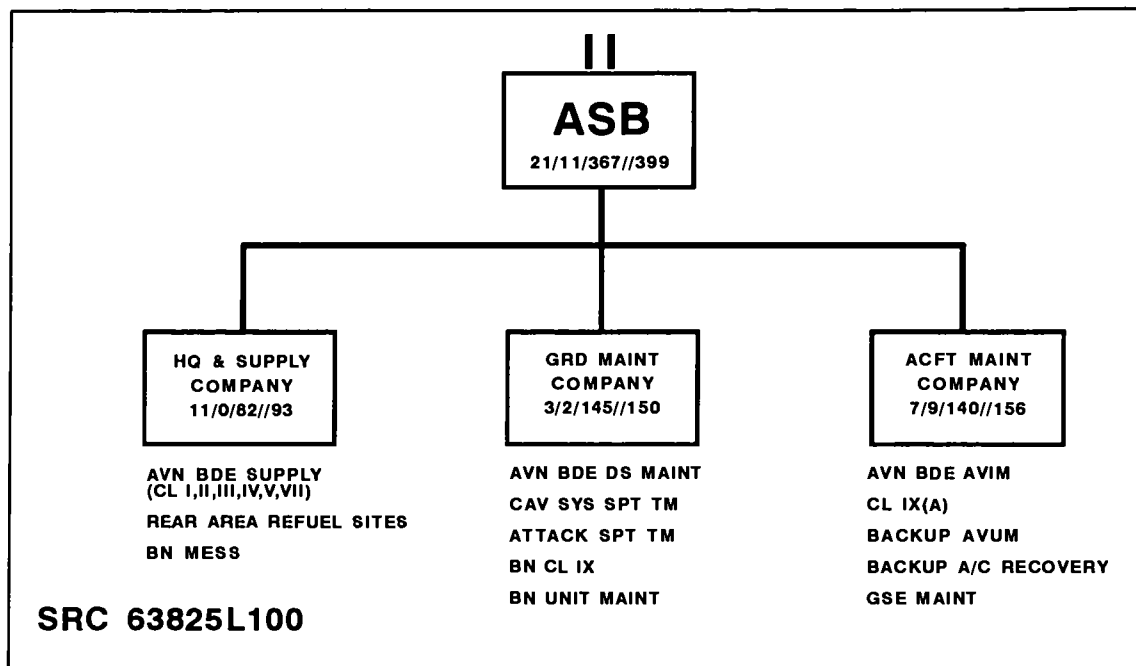


Figure 5-5. Aviation support battalion (1 attack battalion)

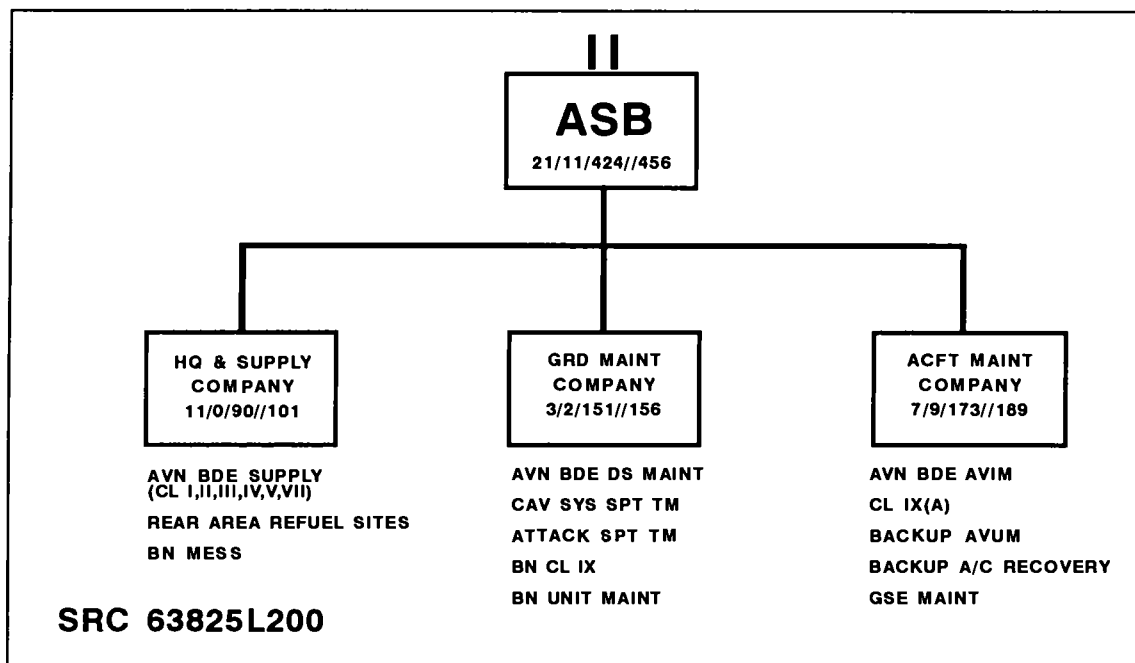


Figure 5-6. Aviation support battalion (2 attack battalions)



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CHAPTER 6

NIGHT AND SEASONAL OPERATIONS

Successful FARP operations under varied environmental conditions require prior planning and training. Different environments require different considerations. This chapter discusses considerations for night, hot weather, and winter FARP operations.

6-1. NIGHT OPERATIONS

a. The establishment of a FARP at night requires special considerations. Movement of the FARP must be planned in detail and executed in an orderly manner. Delays will occur because of low light levels. Light discipline is extremely important, and personnel must guard against the tendency to ignore it.

b. Once the FARP is in position, it should remain blacked out until friendly aircraft arrive. Arriving aircraft should use a prearranged signal to let FARP personnel know that friendly aircraft are present. Aviators should be able to navigate to the FARP by using maps, global positioning system devices, or Doppler navigation systems. Once in the area, the aircraft could transmit a simple, short message. For example, using a single word such as "Bravo" is sufficient. "Bravo" would alert FARP personnel that friendly aircraft are nearby and that they can safely turn on the site location markers.

c. The location of the FARP can be marked in several ways. If aircrews are equipped with night vision devices, a low level infrared light source may be used. Alternate marking techniques include a flashlight with colored lens, chemical lights, or colored beanbag lights. If the existing light level is high, such as during a full moon, engineer tape or other high-contrast materials that are staked to the ground may adequately mark the site.

d. During arming and refueling operations, artificial lights may be needed because of the low natural light level. Color-coded, low-intensity light sources may be used to indicate direction, takeoff and landing areas, and pad sites.

NOTE: Only red lights should be used to mark obstacles.

e. The use of artificial lights in the FARP poses several problems. The FARP will probably be in total darkness until aircraft arrive. When personnel start working with lights, their night visual acuity may be impaired. FARP personnel will be constantly adjusting from a no-light to a low-light working environment. Each time the light level changes, FARP personnel may need time for their night vision to readapt.

f. The glow from a chemical light, when placed nearby, can disturb a worker's vision. Objects may be blurred when looked at closely. Artificial light sources are a problem because they cannot be placed to adequately illuminate the work and leave both hands free.

g. To overcome the low-light limitations, FARP personnel should use NVDs. However, their use requires extensive training or aircraft turnaround times will increase. NVDs may be the best choice for night FARP operations. They have advantages and disadvantages. Some of these are discussed below.

(1) Advantages.

(a) Passive lighting greatly reduces the enemy's ability to detect the FARP.

(b) Aircrews and FARP personnel will be using systems that are compatible, and FARP lighting will not interfere with aircraft night sight systems.

(c) The same signals, such as hand and arm signals and flags, can be used during the day and at night.

(2) Disadvantages.

(a) Minimum focus distance is 10 inches; therefore, objects any closer will be blurred.

(b) Close work space around weapon systems may impair the individual's efficiency.

(c) Night vision devices may not be compatible with current NBC equipment.

(d) The unit may not have enough night vision devices to support both aircrew and FARP personnel.

6-2. HOT WEATHER OPERATIONS

The desert environment poses many difficult problems for FARP operations. Factors to be considered are terrain, mobility, communications, flying techniques, high-density altitude, and FARE systems.

a. Desert Terrain.

(1) The desert has many different types of sand. Sand may be as fine as talcum powder or as coarse as gravel. Off-road vehicle mobility will be affected by the type of sand. In many areas, a crust may form on the surface of the sand. If the crust is dark-colored, the sand is very coarse. In such situations, the light sand has been blown away, leaving a gravel and sand mix. This surface crust may become so hard that a helicopter could land with almost no dust signature.

(2) The flat terrain and poor relief of the desert create serious navigational problems. Therefore, FARPs must be established in easily recognizable positions. The use of offset, low-output NDBs will assist in locating FARP positions. Night navigation equipment, such as Doppler, makes desert navigation easier.

(3) Desert activities can be observed from as far away as 10 kilometers. From a vantage point of high ground, activity can be observed from as far away as 20 kilometers. The FARP will be a target of opportunity for any enemy pilot who can see it. Without cover and concealment, the FARP must have AD protection.

b. Mobility.

(1) The best ground vehicles for the desert are the 1 1/4-ton truck, 2 1/2-ton truck, 5-ton truck, and HEMTT. Most vehicle trailers are unsuitable for off-road travel, except for the HEMAT.

(2) The easiest and fastest way to establish a FARP in the desert is to sling load it into position. Two FARE systems oriented into the prevailing wind and set up in a T-formation, as shown in Figure 6-1, will allow for adequate separation from the turning rotors. This system can support four refueling points. The FARP should be positioned to facilitate ground vehicle support. This eases the strain of trying to aeri ally support the FARP.

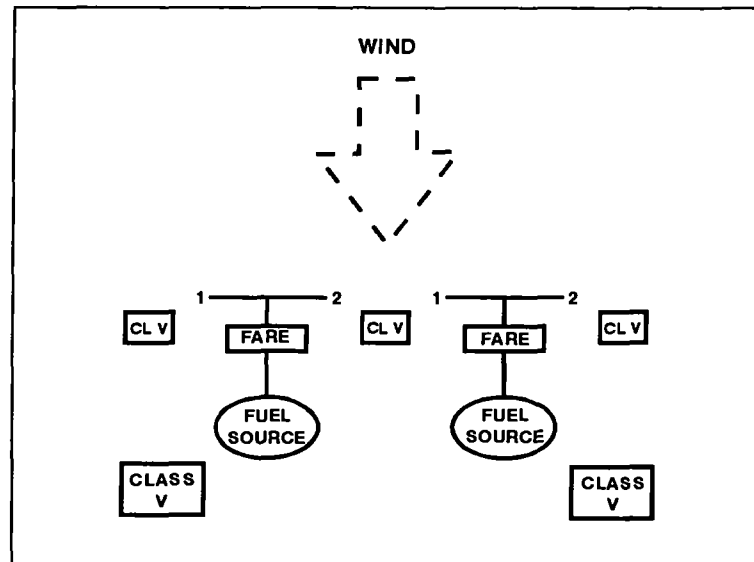


Figure 6-1. T-formation FARE setup

c. Communications. Electronic communication capabilities will vary from day to day. Communicating with an element more than 25 kilometers away may require a relay station.

d. Flying Techniques. The dust signatures of aircraft operating in the desert will be reduced if airspeed is kept above 40 knots. In-ground effect hovering should not be attempted. Instead, approaches should be planned and executed to the ground. Correct desert flying techniques will help ensure that the aircrew maintains visual contact with the ground.

e. High-Density Altitude.

(1) Most desert operations will be affected by high-density altitudes. High-density altitudes will degrade aircraft performance. In the early morning when density altitude is lowest, the UH-60 may be able to carry two full 500-gallon collapsible fuel drums. By noon, the UH-60 may only be able to carry one collapsible fuel drum. An attack helicopter may have to carry less than a full load of ammunition and/or fuel. In either case, more frequent trips to the FARP will be necessary. The FARP must be logistically prepared for them.

(2) An adequate water supply should be available in the FARP. Aircrews and ground personnel will perspire profusely. To prevent heat casualties or extensive dehydration, each individual must drink plenty of water, up to 5 gallons every 24 hours.

f. FARE Systems. FARE systems will function well in a desert environment, but they must be dug in or sandbagged. For optimum performance, the fuel source (500-gallon collapsible

drum) should be at a level equal to or higher than the pump. All small engine-driven equipment must be protected from blowing sand to prevent mechanical problems. In a desert environment, special attention should be given to FARP equipment. The procedures listed below will help ensure the continued operation of the FARE system.

(1) Filter/separator elements must be replaced when they fail or when the pressure differential indicator shows that they must be changed.

(2) Oil filters should be changed or cleaned at least every six hours.

(3) Small engine air filters need to be cleaned daily with compressed air, and they should be replaced weekly.

(4) Each generator should have a backup. A generator should run continuously for no more than three to six hours before being replaced by a backup.

g. Additional Conditions and Characteristics. Other conditions and characteristics peculiar to the desert that all personnel should be aware of are listed below.

(1) Visual illusions (mirages) will affect all personnel.

(2) Dust storms will restrict the ability to see and breathe.

(3) Preventive maintenance checks and services should be performed twice a day.

(4) Continued exposure to bright sunlight will cause severe eyestrain or sun blindness unless personnel take proper preventive measures.

(5) Light can be seen for great distances over flat terrain. A pink filter can be seen more than five miles away by someone using a night vision device.

(6) Ground vehicles are easy to identify in the desert. Silhouettes and shadows are easily detected because they contrast with the lighter natural background.

(7) In sandy areas, turret weapon systems will need frequent cleaning and a light coat of lubricant. The use of lubricants without proper cleaning will cause a buildup of sand in the gear mechanism. This will cause weapons to jam. Optical

sights should be protected from blowing sand that could scar the glass window of the telescopic sight unit.

6-3. WINTER OPERATIONS

a. More than 50 percent of the world could become a winter battlefield; aviation units must be prepared to operate in this environment. The winter battlefield is characterized by low temperatures; fog; freezing rain; snow; ice; frozen ground; and, at times, muddy ground. FARP operations are difficult under these conditions, and detailed planning and training are necessary to overcome them.

b. Snow, ice, and mud may reduce vehicle mobility on the winter battlefield, complicating FARP displacement. Commanders should plan for aerial displacement when possible. If ground displacement is necessary, more time for movement should be allowed. Regardless of the displacement method used, the breakdown and setup of the FARP will take more time on the winter battlefield than in other environments.

c. Low temperatures will make it difficult for FARP personnel to keep warm and function. Windchill caused by helicopter rotor wash will result in cold injuries even when air temperatures are not very cold. Fuel accidentally spilled on bare skin or soaked into clothing will have a cooling effect as it evaporates, increasing the probability of cold injury. Personnel handling cold ammunition will need mittens or other protection. They also will need a lighter pair of gloves when manual dexterity is needed to perform delicate operations. Commanders should ensure that FARP personnel are properly equipped and trained to function in a cold environment.

d. Marking the FARP for aircraft control requires special consideration on the winter battlefield. Engineer tape cannot be used on snow as a marker for aircraft control. Marker panels can quickly become obscured by falling snow. Hand and arm signals, flashlights, or smoke may be used, depending on weather conditions. Maneuvering aircraft on loose snow surfaces may cause clouds of blowing snow, which can partially or totally obscure ground guides or other control measures. Blowing snow could cause aircrews to become disoriented and lose aircraft control. These problems can be reduced by packing the snow or by spraying the snow surface with water to form a crust of ice.

e. Camouflage of the FARP on the winter battlefield can be difficult, particularly where there is complete snow cover. The use of white covers and snow as camouflage is a possible solution. The best solution, however, is to avoid open snowfields when selecting FARP locations. Instead, the FARP should be

located near partially wooded or urban areas. FM 20-3 describes camouflage procedures in detail.

f. Electrically grounding FARP equipment and aircraft is another problem. Frozen ground makes the emplacement of grounding rods difficult and reduces the effectiveness of the electrical ground. To emplace a grounding rod, a hole must be dug, drilled, blasted, or melted and the rod placed in the hole. To ensure the proper flow of electricity, paper or other absorbent material is filled in around the rod and then soaked with salt water.

g. Maintenance requirements for aircraft and FARP equipment will be increased on the winter battlefield. When aircraft icing occurs, FARP personnel may have to deice the aircraft. In cases of extremely thick ice, a Herman Nelson heater or an aviation ground power unit may be the only effective deicing equipment available. At times, ammunition can freeze. Deice caps for the Hellfire missile are available. They are fitted over the seeker to prevent it from freezing. Rocket pod covers also are available. These covers fit snugly over the rockets, and the rockets can be shot through them. All of the FARP equipment must be "winterized" with additional antifreeze or low-temperature lubricants.

NOTE: Static electricity is more prevalent in cold environments because of low humidity.



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CHAPTER 7

ENVIRONMENTAL CONSIDERATIONS

While the commander's responsibilities extend across every aspect of the mission, there is one area of responsibility that impacts virtually every action and operation: the environment. Accomplishing the mission always has been and always will be the top priority. However, successfully blending the military mission with the environmental challenge is now equally important. Conserving, protecting, and restoring our natural and cultural resources is the first line of defense for the heritage of future generations and the Army's mission.

7-1. ARMY ENVIRONMENTAL MANAGEMENT POLICY

The Army Environmental Management Policy, as stated below, has been endorsed by the Army Chief of Staff and the Secretary of the Army.

"Protection of precious environmental resources is the duty of every member of the Total Army. Charged with the stewardship of over 20 million acres of land, we must never lose sight of our responsibility to preserve and protect the resources that have been entrusted to our care....

The guiding principle is that work and actions must be environmentally sustainable, meeting current needs without compromising the integrity of the environment for future generations. As a basis to our Environmental Management Policy we must:

- Integrate environmental consideration into all of our activities.
- Allocate resources and training to protect our environment.
- Ensure that installation operations are environmentally acceptable and enhance the life of military and civilian members.
- Minimize the generation of waste.
- Clean up sites of past contamination.

All of us, Total Army members and leaders, military and civilian, must ensure that we are well aware of our responsibilities as we set the standard for the Department of Defense and the Nation in meeting the environmental challenges of the 1990s and beyond."

-The Department of the Army Environmental
Management Policy Memorandum, 17 July 1990

7-2. LIABILITY

a. Several civil and criminal penalties are associated with improper environmental management. The commander has ultimate responsibility and therefore should familiarize himself with the laws. Some of these are the--

- Hazardous Materials Transportation Act.
- Occupational Safety and Health Act.
- Clean Air Act.
- Toxic Substances Control Act.
- Resource Conservation and Recovery Act.
- Safe Drinking Water Act.

b. Maximum penalties vary by statute and include fines ranging from \$10,000 to \$25,000 per day of violation and imprisonment from 1 year to 15 years. In case of a civil enforcement, the installation and its budget would suffer the consequences of enforcement. As far as personal liability, the commander must understand that direct participation in the violation of an environmental statute is but one theory of liability that could subject him to prosecution in the Federal district court.

c. The commander who does not act promptly to correct environmental violations that he is aware of or should be aware of may be subject to prosecution even though he had no direct or indirect involvement in the violation.

d. If violations of the law do occur, the best course of action for the commander to take is to inform the appropriate regulatory authorities immediately and engage in good faith efforts to comply.

7-3. SPILL DEFINITIONS

a. A spill is broadly defined as a release of any kind of a petroleum product or hazardous substance to the environment. Spill reaction is based largely on the nature of the material spilled. The three types of spills are: small priming spills, small spills, and large spills.

(1) Small priming spill. A small priming spill covers less than 18 inches in all directions.

(2) Small spill. A small spill extends less than 10 feet in any direction, covers less than 50 square feet, and is not continuous.

(3) Large spill. A large spill extends farther than 10 feet in any direction, covers an area in excess of 50 feet, or is continuous; for example, a leaking tank.

b. For purposes of reporting to federal, state, and local authorities, an oil spill is defined as any spill that reaches a stream, creek, river, or any other body of water in harmful quantities. In addition, any oil spill that could possibly come into contact with the aqua line of the local water table will be reported. Harmful quantities violate applicable water quality standards or cause a film or sheen upon, or discoloration of, the surface of the water or adjoining shorelines. They also cause a sludge or emulsion to be deposited beneath the surface of the water or upon adjoining shorelines.

c. The information relative to spill size and reportable spills discussed in this chapter applies only to oil spills and not to hazardous substances. The commander or on-site coordinator is the only person authorized to report spills. He will report all spills of any kind that he deems significant, including any spill that results in fire or explosion.

7-4. SPILL DISCOVERY

The initial component in the spill-response plan is discovery. The primary responsibility of a discoverer is to notify the proper authorities, who are trained and equipped to deal with an environmental incident. When a spill is discovered, the person discovering the spill will--

- Take action to stop the source of the spill **if he is properly trained to do so and if it can be done safely.**
- Begin the notification process.

7-5. ASSESSMENT

a. During every step of the spill-response process, each responding individual will continually assess the situation and make decisions on the next appropriate action to be taken. Upon initial discovery, the discoverer and/or the supervisor will provide the--

- Time and type of incident.
- Name and quantity of spilled material involved (to the extent known) and the rate of release.
- Direction of the spill, vapor, or smoke release.
- Fire and/or explosion possibility.
- Coverage area of spill and the intensity of any fire or explosion.
- Extent of injuries, if any.

b. The commander or on-site coordinator will determine the appropriate response based upon the potential risks associated with the spill and whether an imminent or actual threat exists to human health or the environment. The appropriate notifications will be made and the response team will be mobilized to control, contain, and clean up any spilled material if--

- The spill could result in the release of flammable or combustible liquids or vapors, thus causing a fire or gas explosion hazard.
- The spill could cause the release of toxic liquid or fumes.
- The spill can be contained on the site, but the potential exists for ground water contamination.
- The spill cannot be contained on the site, resulting in off-site soil contamination and/or ground- or surface-water contamination.

7-6. RESPONSE PHASES FOR OIL SPILLS

Defensive actions should begin as soon as possible to prevent or minimize damage to public health and welfare or to the environment. Some general actions that must be taken are to--

- Eliminate sources of sparks or flames.
- Control the source of the discharge.
- Place physical barriers, such as berms or dikes, to deter the spread of the oil.
- Prevent the discharge of contaminated water into storm drains or the sewer system.
- Recover the oil or minimize its effects.
- Place recovered oil and contaminated absorbents, such as rags, in DOT-approved containers and dispose of them as hazardous waste.

7-7. OIL SPILL CLEANUP

a. Specific actions to be taken for each type of oil spill are discussed in the paragraphs that follow.

(1) Small priming spill. A fireguard will be posted at the spill until the vapors have dissipated.

(2) Small spill. Operations in the area will be stopped and a fireguard posted. If the fuel spill is on concrete or a similar hard surface, an absorbent cleaning agent will be used to clean up the spill. After the spill is cleaned up, the absorbent material will be placed in a closed metal container until it can be burned. If AVGAS or JP4 has been spilled, do not use rags to absorb the spill. If the fuel is spilled on the ground or on a hard surface and is well removed from operational areas, the spill area will be roped off until the fuel has evaporated and the vapors have dispersed. Operations will cease and personnel will not be allowed in the area until the fuel is vapor-free.

(3) Large spill. The fire department will be called immediately, and the flow of fuel will be stopped. After all safety precautions have been taken, personnel will consider--

- Removing aircraft and personnel from the spill area.
- Removing refueling vehicles from the spill area.
- Reducing equipment engine speeds and shutting engines off.
- Blanketing large fuel spills with foam.

- Blanketing large fuel spills with foam.

NOTE: Subsequent recovery of fuels will be directed by the fire chief. The area must not be used for operations until it is declared free of fuel and fuel vapors.

b. Cleanup operations will be directed by the commander or on-site coordinator as discussed in the paragraphs below.

(1) If spill material is not contained within bermed areas or grated trenches, then an area of isolation will be established around the spill. The size of this area will generally depend upon the size of the spill and the waste that is removed.

(2) If the spill results in the formation of a toxic vapor cloud, evacuation procedures will be enforced. If large quantities of volatile (toxic or combustible) materials are spilled, an area at least 500 feet wide and 1,000 feet long will be evacuated downwind. The Air Weather Service should be contacted for information concerning ambient wind speeds and directions. They will assist the fire chief and the commander or on-site coordinator by providing toxic corridor computations for toxic vapor clouds.

(3) Using pumps or tank trucks, as much of the material as possible will be collected.

(4) Hay or other absorbent material will be used to absorb the oil that cannot be collected by pumping.

(5) Contaminated earth, hay, or other absorbent material will be disposed of in an approved manner as directed by the commander or on-site coordinator.

(6) The commander or on-site coordinator will determine when the area has been cleaned up enough for normal service to return.

(7) Oil-contaminated dirt may be disposed of in an area of the sanitary landfill designated for that purpose. However, oil contaminant levels must be within federal, state, and local limits for landfill disposal.

c. When any spill occurs, only those personnel involved in overseeing or performing emergency operations will be allowed within the designated hazard area. If possible, the area will be roped or otherwise blocked off.

d. As soon as a reportable oil spill is discovered, the chain of command will be notified of the spill. The commander or on-site coordinator will notify the National Response Center and the Emergency Management Agency when approval is received from the division commander.

7-8. RESPONSIBILITIES AND DUTIES OF THE ON-SITE COORDINATOR

a. According to AR 200-1, an on-site coordinator will be appointed by the division commander. The on-site coordinator is primarily responsible for response actions following a spill and will coordinate response plans with the response team, state, and local representatives. The coordinator--

- Ensures that a disaster response force is alerted and dispatched to the accident scene.
- Reports to the accident scene or convoy.
- Ensures that the mobile command post is properly located or relocated, if necessary.
- Receives a briefing from the fire chief and/or other personnel on the actions taken.
- Assumes command.
- Ensures that essential personnel and equipment are present.
- Determines the need for additional support teams.
- Ensures that the area is evacuated and that a disaster cordon has been established.
- Keeps the EOC informed of the situation and actions taken.
- Ensures that the entry control point on the cordon is established and is free of unnecessary personnel.
- Declares "all clear" following withdrawal, as the situation dictates.
- Assembles an on-scene control group and determines the need for initial reconnaissance of the disaster area.
- Briefs and debriefs the response team.

- Secures the accident scene after the area is declared safe.
- Implements entry control procedures, as required.
- Coordinates with local civil authorities regarding the appropriate action to be taken at the accident scene.
- Coordinates logistical support, as necessary.
- Reports all spills of reportable quantities of oil and hazardous substances according to AR 500-60 through command channels to the appropriate authorities.
- Ensures that the response team and the appropriate DOD agencies are notified for necessary action if installation personnel cannot respond sufficiently to contain and clean up the spill.

b. Normally, the fire department chief and the environmental coordinator are active members of the response team. They will respond to the scene and assess the seriousness of the situation. If necessary, they will request additional assistance. Both individuals will serve jointly in this capacity during duty hours and after duty hours.

7-9. RESPONSE TEAM ORGANIZATION AND TRAINING

a. **Organization.** The organization of the response team is governed at the installation or the major subordinate command. The training of these personnel is critical and will be conducted to ensure that the response team is properly trained and a system is in place to manage the personnel in case of an emergency. This training will be provided at the installation or major subordinate command level.

b. **Training.**

(1) Training is made up of classroom and emergency-response training exercises. Classroom instruction is used to instruct response team members in the hazards of the substances they may be exposed to during a spill response. Field training exercises provide training on actual spill-control and cleanup activities. Members of the team will receive proper hazardous substance response training as discussed in the following paragraphs.

(a) Members will become intimately familiar with the various facility layouts and the types of oil and hazardous substances used.

(b) Members will be trained in the use of self-contained breathing apparatuses. They will practice donning, using, and removing the equipment on a quarterly basis. Tanks will be refilled after each actual or training session.

(c) Members will be indoctrinated in classification of hazardous substances, their characteristics, and how to clean a spill and decontaminate the area. Incompatibilities between chemicals also will be covered.

(d) Members will receive the appropriate safety and occupational health training. A periodic health monitoring program will be established for military and civilian personnel that are responsible for carrying out official duties at oil and hazardous substance spill sites. In addition, members will receive training in--

- Methods of retaining spills.
- Methods of recovering spilled substances.
- The disposition of contaminated soil, absorbent material, and recovered pollutants.
- Restoring the contaminated area to its former condition.

(2) One annual training exercise will be held to provide spill-response training to the members of the response team. The chief of the exercise evaluation team will conduct the exercises, evaluate the results, and report the results of the training exercises.

(3) Individuals working in areas where oil or hazardous substances are stored, transferred, or used require some level of training to familiarize them with any hazards associated with those materials. The recommended training is discussed below.

(a) Individuals will be instructed in the safety significance of the chemical spill procedure by their supervisor. Those working routinely with hazardous substances should receive a one- or two-day industrial hazards course.

(b) Each newly assigned individual will be trained to react to hazardous substance spills before being exposed to the substances.



APPENDIX A **STANDARD HAND AND ARM SIGNALS**

This appendix implements portions of STANAG 3117 and AIR STD 44/42A and STANAG 2999.

Figures A-1 through A-47 show standard hand and arm signals.

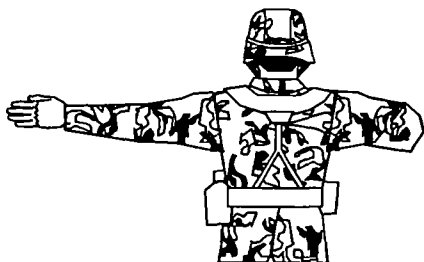
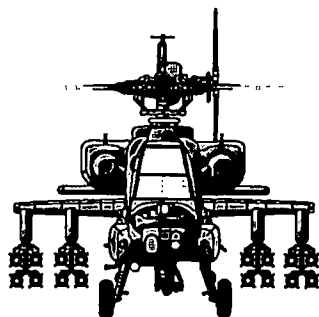


Figure A-1. Position of ground guide for a rotary-wing aircraft.

Figure A-2. Proceed to next ground guide. Both arms extended on same side of shoulder level to indicate direction of next ground guide.



Figure A-3. This way. Arms above head in vertical position with palms facing inward.



Figure A-4. Move ahead. Arms a little apart with palms facing backward and repeatedly moved upward and backward from shoulder height. Indicate the aircraft speed desired by rapidity of arm motions.



Figure A-5. Turn to left (port). Position right arm down, and point to left wheel or skid; move left arm repeatedly upward and backward. Indicate rate of turn by rapidity of arm motions.

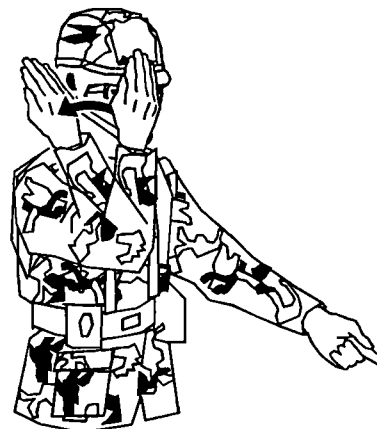


Figure A-6. Turn to right (starboard). Position left arm down, and point to right wheel or skid; move right arm repeatedly upward and backward. Indicate rate of turn by rapidity of arm motions.

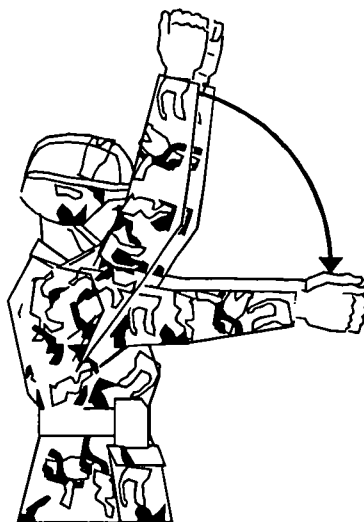


Figure A-7. Landing direction. Ground guide stands with arms raised vertically above head and facing toward the point where the aircraft is to land. The arms are lowered repeatedly from a vertical to a horizontal position, stopping finally in the horizontal position.

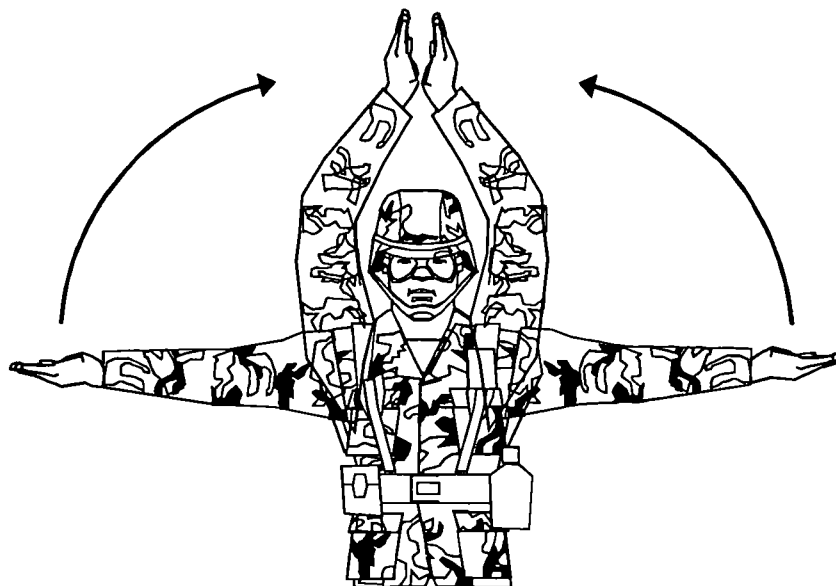


Figure A-8. Move upward. Extend arms horizontally to the side, beckoning upward with palms turned up. Indicate rate of ascent by speed of movement.



Figure A-9. Hover. Extend arms horizontally sideways with palms turned down.



Figure A-10. Move downward. Extend arms horizontally to the side, beckoning downward with palms turned down. Indicate rate of descent by rapidity of arm motions.

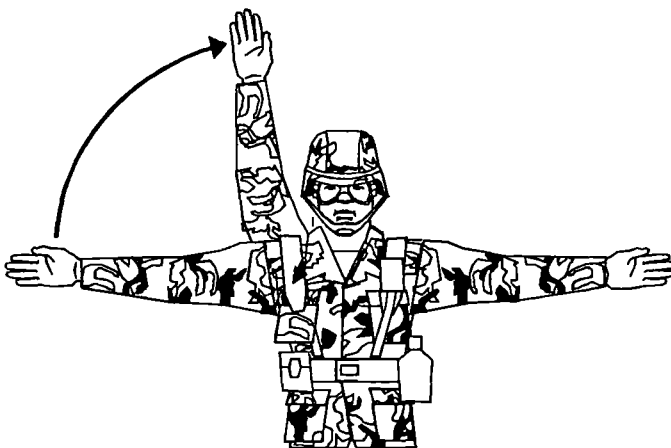


Figure A-11. Move to right. Left arm extended horizontally sideways in direction of movement and right arm swung over the head in same direction in a repeating movement.



Figure A-12. Move to left. Right arm extended horizontally sideways in direction of movement and left arm swung over the head in same direction in a repeating movement.



Figure A-13. Slow down. Arms down with palms toward ground and then moved up and down several times.

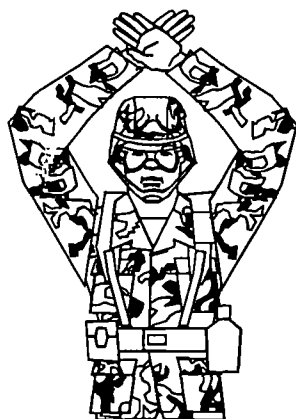


Figure A-14. Stop. Cross arms above head with palms facing forward.



Figure A-15. Brakes.

On (day): Arms above head, open palms and fingers raised with palms toward aircraft, and then fist closed.

On (night): Arms above head and then wands crossed.

Off (day): Reverse of above.

Off (night): Crossed wands and then uncrossed.



Figure A-16. Fire. Make rapid horizontal figure-eight motion at waist level with either arm, pointing at source of fire with the other.



Figure A-17. Engage rotor(s). Circular motion in horizontal plane with right hand above head.

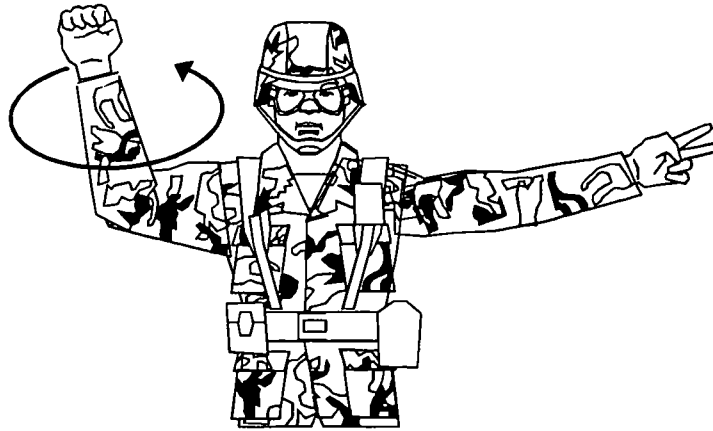


Figure A-18. Start engine(s). Day: Left hand overhead with appropriate number of fingers extended to indicate the number of the engine to be started and circular motion of right hand at head level. Night: Similar to day signal except that the wand in the left hand will be flashed indicating the engine to be started.

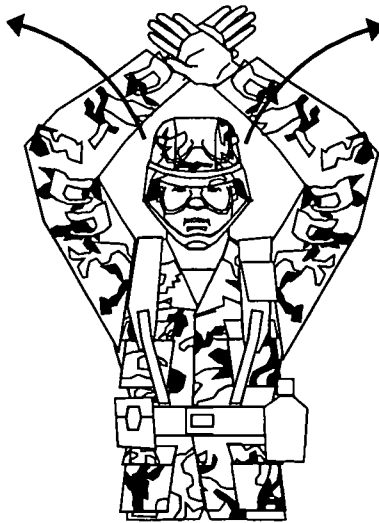


Figure A-19. Wave-off. Waving of arms over the head.



Figure A-20. Affirmative (all clear). Hand raised with thumb up.



Figure A-21. Negative (not clear). Arm held out, hand below waist level, and thumb turned down.

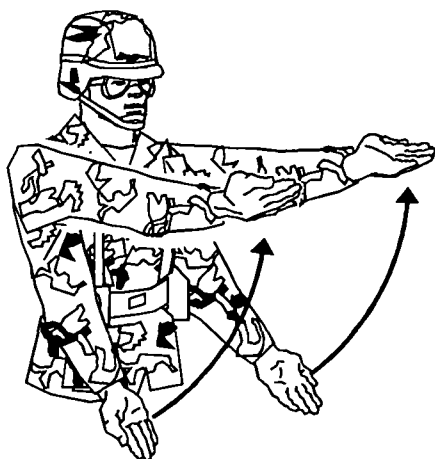


Figure A-22. Move back. Hold hands down by side; face palms forward; and, with elbows straight, repeatedly move arms forward and upward to shoulder height.



Figure A-23. Land. Cross hands and extend arms downward in front of the body.



Figure A-24. Tail to right (starboard). Point left arm down, and move right arm from overhead vertical position to horizontal forward position. Repeat right arm movement.

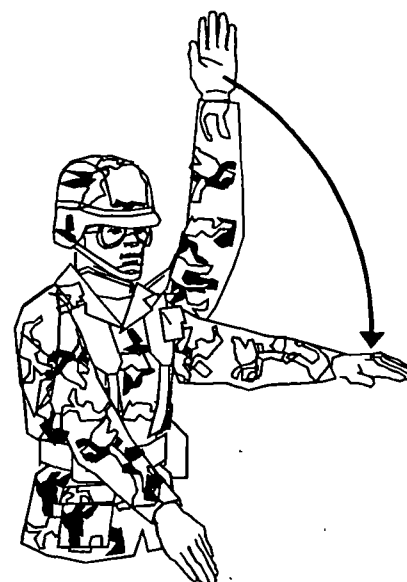


Figure A-25. Tail to left (port). Point right arm down, and move left arm from overhead vertical position to horizontal forward position. Repeat left arm movement.

Turns While Backing

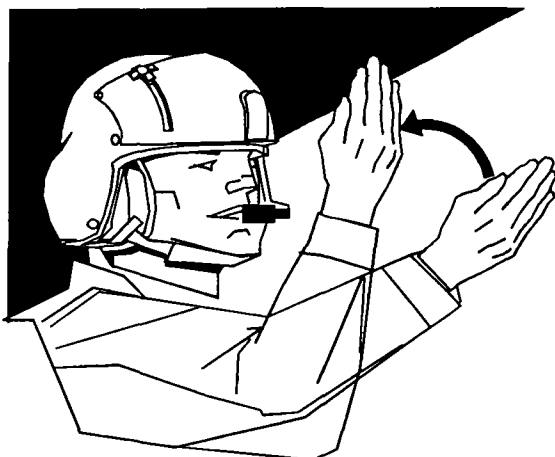


Figure A-26. Clearance for personnel to approach aircraft. A beckoning motion with right hand at eye level.

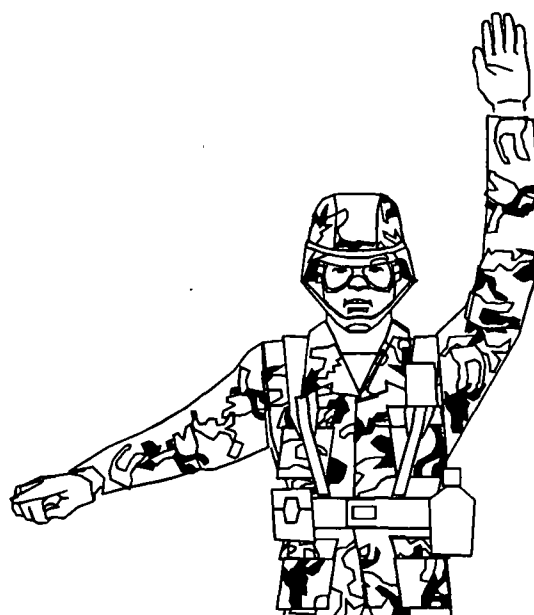


Figure A-27. Personnel approach the aircraft (given by ground crew member). Left hand raised vertically overhead with palm toward aircraft. The right hand indicates the persons concerned and gestures toward aircraft.



Tail Hook (Up) (Down)

Figure A-28. Up hook. Right fist, thumb extended upward, raised suddenly to meet horizontal palm of left hand.



Figure A-29. Down hook. Right fist, thumb extended downward, lowered suddenly to meet horizontal palm of left hand.

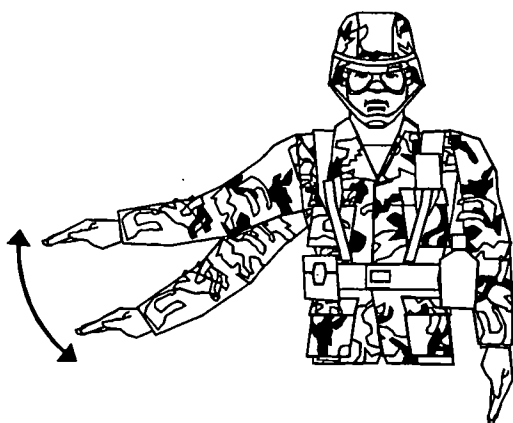


Figure A-30. Slow down engine(s) on indicated side. Arms down with palms toward ground and then either right or left arm waved up and down to indicate that left- or right-side engines, respectively, should be slowed down.



Figure A-31. Cut engine(s) or stop rotor(s). Either arm and hand level with shoulder with palm down; draw the extended hand across neck in a "throat-cutting" motion.

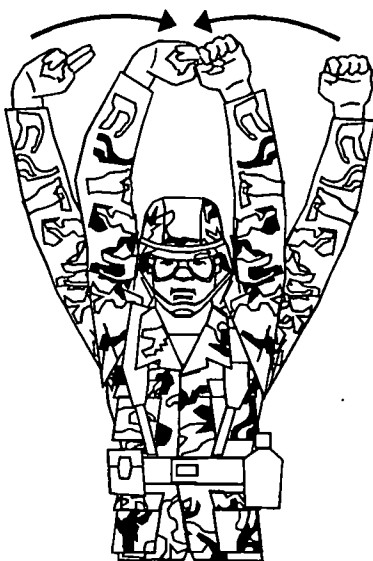


Figure A-32. Connect APU.

Day: Extend hands overhead; push first two fingers of right hand into fist of left hand.

Night: Same movement with the left-hand lighted wand vertical and the right-hand lighted wand horizontal.



Figure A-33. Disconnect APU.

Day: Extend hands overhead; pull first two fingers of right hand away from left fist.

Night: Same movement except that left-hand lighted wand is vertical and right-hand lighted wand is horizontal.

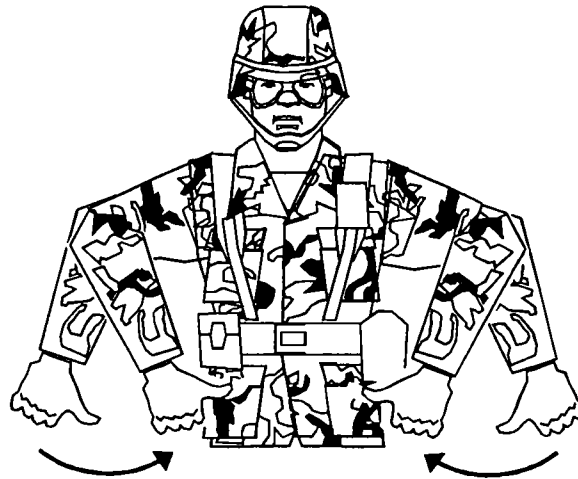


Figure A-34. Insert chocks/chocks inserted. Arms down, fists closed, and thumbs extended inward. Swing arms from extended position inward.

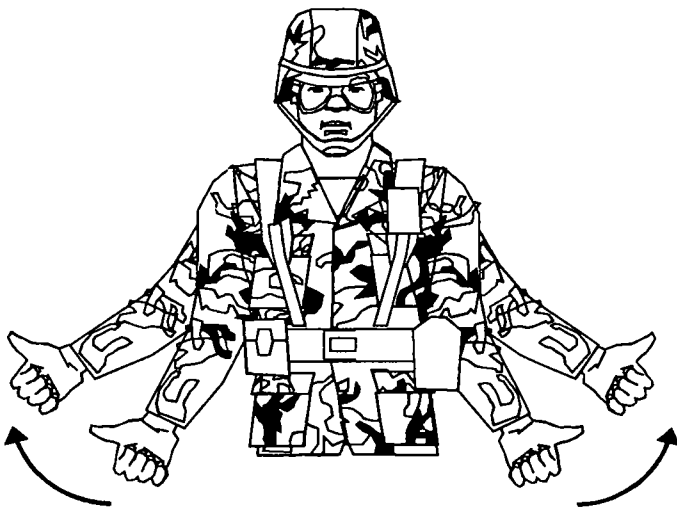


Figure A-35. Remove chocks. Arms down, fists closed, and thumbs extended outward. Swing arms outward.

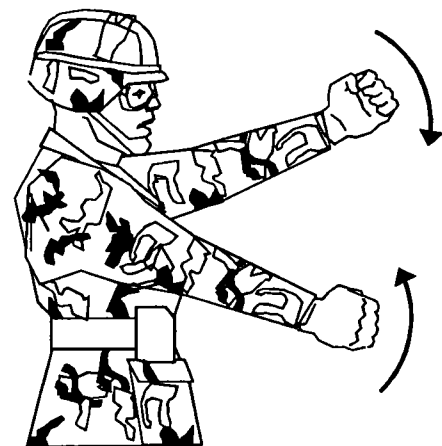


Figure A-36. Hook up load. Rope climbing motion with hands.



Figure A-37. Release load. Left arm forward horizontally with fists clenched; extended right hand making horizontal slicing motion below left arm with palm down.



Figure A-38. Load has not been released. Bend left arm horizontally across chest with fist clenched and palm turned down; open right hand pointed up vertically to center of left fist.

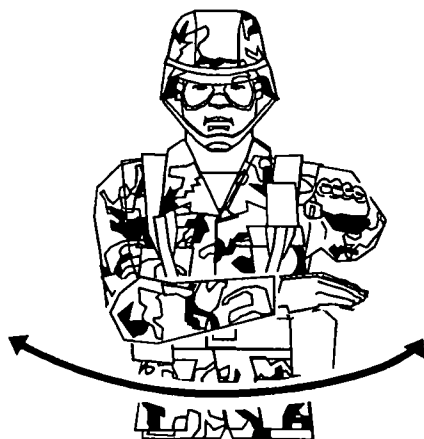


Figure A-39. Cut cable. A signal similar to "release load" except that the left hand has the palm turned down and not clenched. Rapid repetition of right-hand movement indicates urgency.

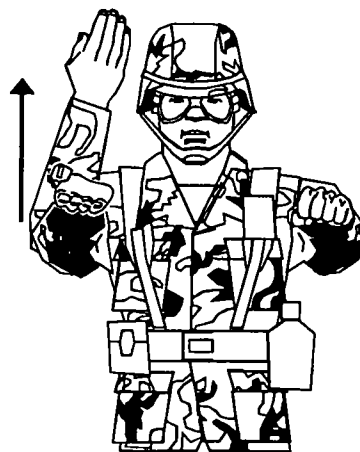


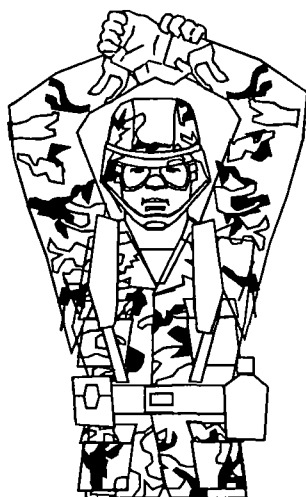
Figure A-40. Winch up. Extend left arm horizontally in front of body with fist clenched; extend right arm forward with palms turned up and make an upward motion.



Figure A-41. Winch down. Extend left arm horizontally in front of body with fist clenched; extend right arm forward with palm turned down and make a downward motion.



Figure A-42. Lock wings/helicopter blades. Hit right elbow with palm of left hand.



Downlocks/Undercarriage Pins

Figure A-43. Install.

Day: With arms above head, the right hand clasps left forearm and the left fist is clenched.
Night: Similar to the day signal except that the right wand is placed against the left forearm. The wand in the left hand is held vertically.



Figure A-44. Remove.

Day: With arms and hands in "install-downlocks" position, the right hand unclasps the left forearm.
Night: Similar to the day signal except that the right wand is placed against the left forearm.



Figure A-45. Remove blade tiedowns. Left hand above head and right hand pointing to individual boots for removal.

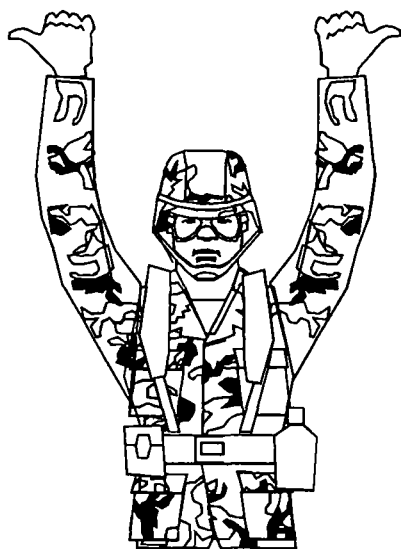


Figure A-46. Droop stops out. When rotor starts to "run down," ground guide stands with both hands raised above head, fists closed, and thumbs pointing out.



Figure A-47. Droop stops in. When droop stops go in, ground guide turns thumbs inward.



APPENDIX B

EMPLACEMENT METHODS

The FARP can be emplaced by ground vehicles or by aircraft. This appendix discusses the ways to accomplish both.

B-1. GROUND VEHICLES

a. The advantages of using small ground vehicles, such as the HMMWV, as a FARE platform to emplace the FARP are mobility, maneuverability, and ease of concealment. The disadvantage is that additional support is required to complete the FARP package.

b. The 3/4-ton trailer offers the FARP a tremendous capability. The entire FARE system (pump and filter/separator) can be bolted to the frame. When set up, this system provides an extremely mobile refueling capability. The system is light enough to be carried by one UH-60, or it can be driven to the FARP site. To complete the FARP package, fuel and ammunition can be pre-positioned or delivered.

c. Another advantage of the HMMWV is that it can transport ammunition from the cargo truck to the armament pad. It can also move the 500-gallon collapsible fuel drums around the FARP if the collapsible fuel drum tow assembly is available.

d. The HEMTT (M977) and the HEMTT tanker (M978) are the primary movers of Class III/V supplies to the FARP (Figure B-1). The M977 can carry 22,000 pounds of cargo. An onboard crane mounted on the rear of the vehicle has a 2,500-pound lift capability. The crane enables the HEMTT to load and off-load ammunition without the need for materiel handling equipment. The M978 tanker holds 2,500 gallons of fuel and provides two refueling points. When paired with the HTARS, the M978 can simultaneously refuel four aircraft. The HEMAT (M989) is used with the M977 or M978. It can carry 22,000 pounds of ammunition. The HEMAT can also carry four 500-gallon collapsible drums or two 600-gallon pods of fuel.

e. The 5-ton truck can transport either ammunition or fuel. When it transports fuel, the truck is normally set up with a TPU consisting of two 600-gallon fuel pods and refueling equipment for two fuel points. The 5-ton truck also can tow a 1 1/2-ton trailer with either a 600-gallon fuel pod or a 500-gallon fuel drum, or the trailer can be used to transport ammunition.

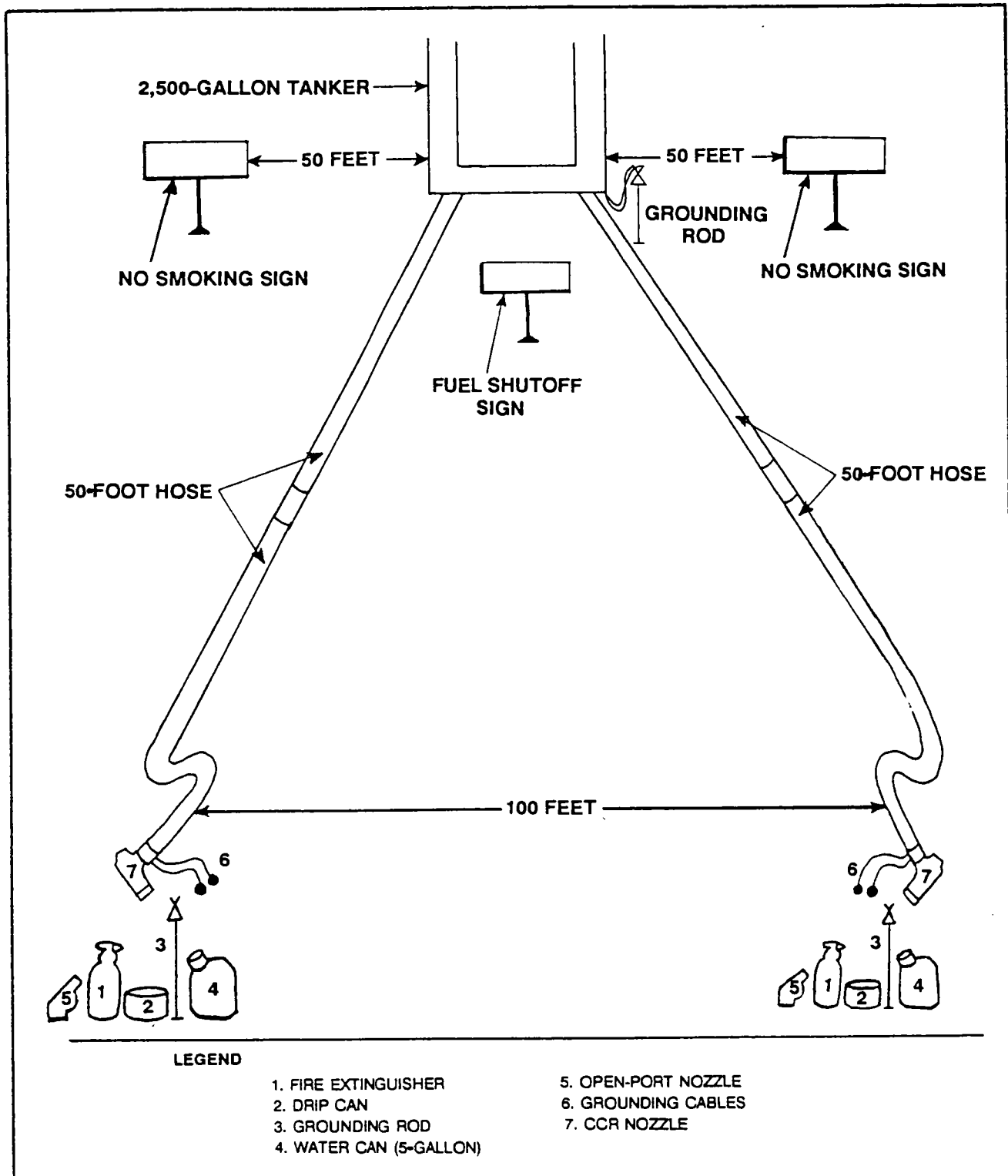


Figure B-1. HEMTT forward arming and refueling point layout

B-2. AIRCRAFT DELIVERY

a. **Jump FARP.** Two UH-60s can deliver an austere jump FARP to its new location. One UH-60 can carry up to two 500-gallon collapsible fuel drums and part of the FARP crew. The other UH-60 transports the rest of the FARP and sling loads the FARE or the AAFARS, which may be mounted on a 3/4-ton trailer. If the FARE or AAFARS is mounted on the trailer and the sides of the trailer are built up with wood, to include a cover, then some ammunition can also be transported. This ensures that the jump FARP will have some ammunition as well as fuel at the scheduled time. The UH-60s can then transport the bulk of the ammunition required for the mission in a second lift.

b. **Advanced Aviation Forward Area Refueling System.** The AAFARS, which is shown in Figure B-2, is a two-man portable system. Its components include a 200-GPM diesel engine pump, a standard element separator, lightweight suction/discharge hoses, and drybreak couplings. It can provide up to four refuel points.

c. **Fat Cow.**

(1) The CH-47's extended range fuel system, better known as Fat Cow, is a modular, interconnectable system composed of up to four 600-gallon noncrashworthy tanks; four electrically operated fuel pumps; a vent system; and associated wiring, plumbing, and mounting hardware. This system can provide up to 2,320 gallons of fuel to refuel other aircraft.

(2) The ERFS increases the commander's mission flexibility by extending aircraft range and by providing an additional forward area refueling source. It is mounted on the left side of the aircraft cargo area between stations 190 and 450; exact placement depends on aircraft center-of-gravity requirements.

(3) Figure B-3 (page B-5) shows the configuration of the ERFS for the CH-47. With the ERFS, little space for cargo and passengers remains. Each side of the aircraft can seat four people. Figure B-4 (page B-6) shows the proper placement for the rest of the required equipment to include the FARE.

(4) After the aircraft lands, the fuel pods can be used to set up refueling points quickly. Figure B-5 (page B-6) shows how the refueling points may be set up. However, the actual setup will depend on the equipment available.

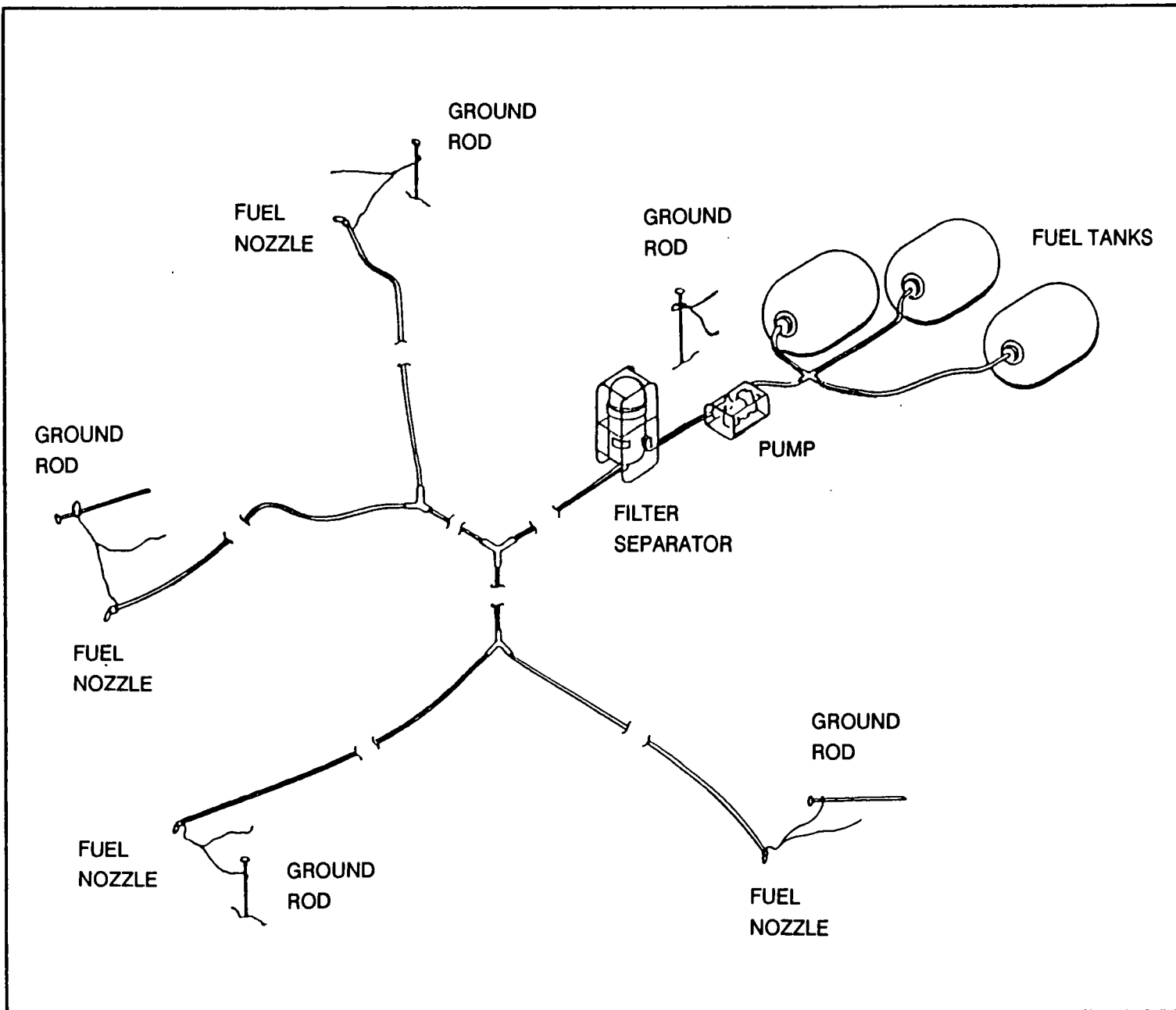


Figure B-2. Advanced aviation forward area refueling system

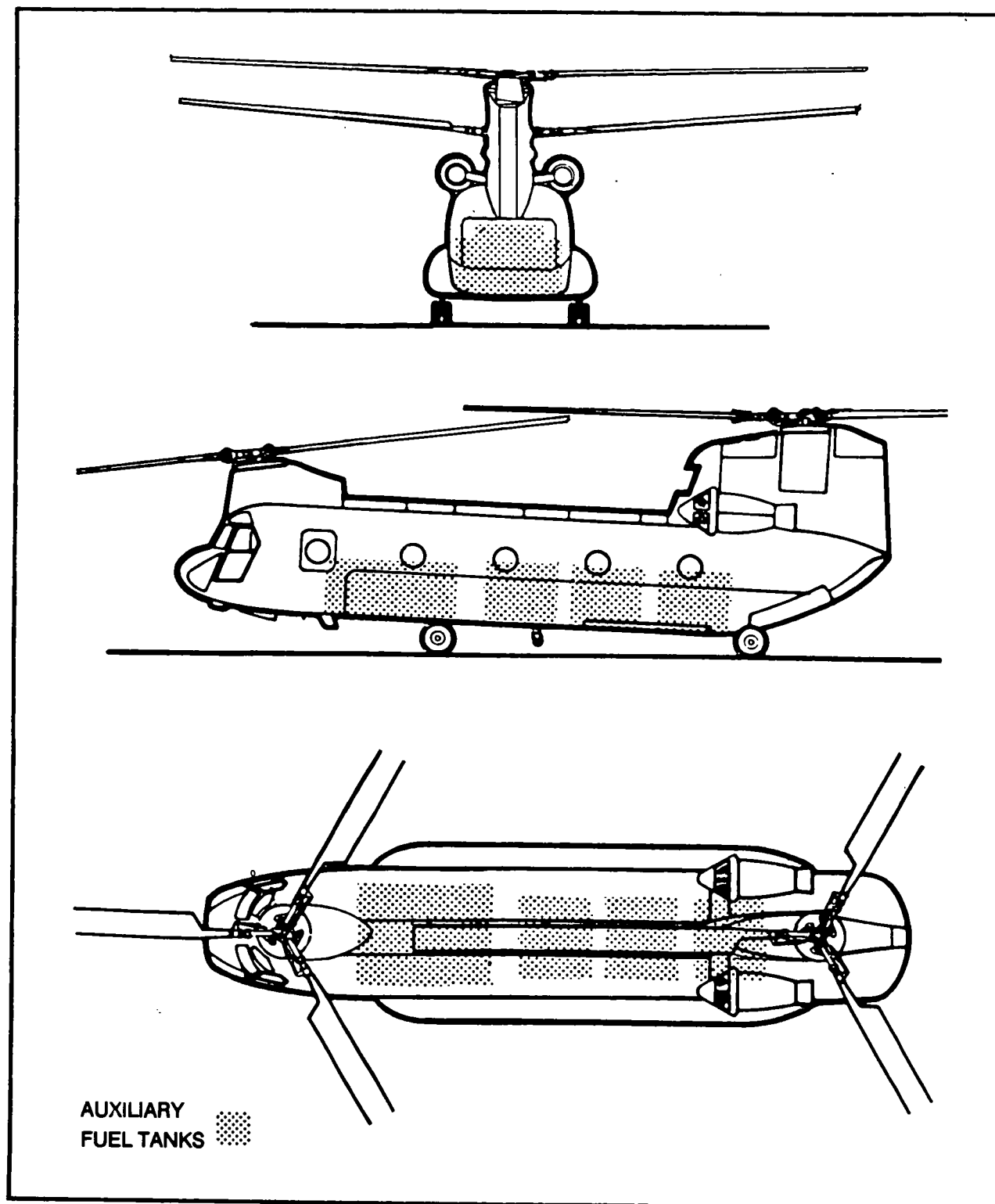


Figure B-3. Configuration of the ERFS

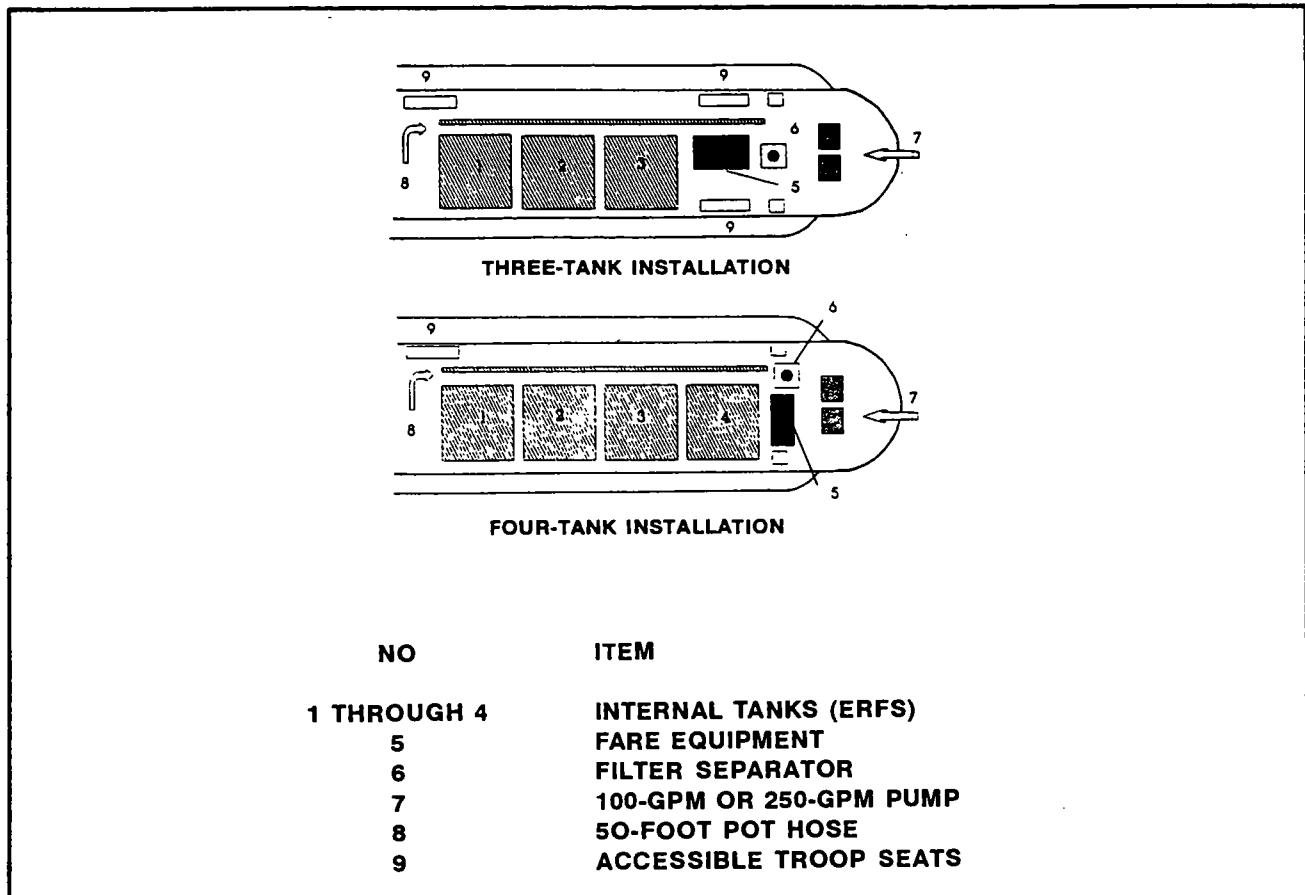


Figure B-4. Gear board

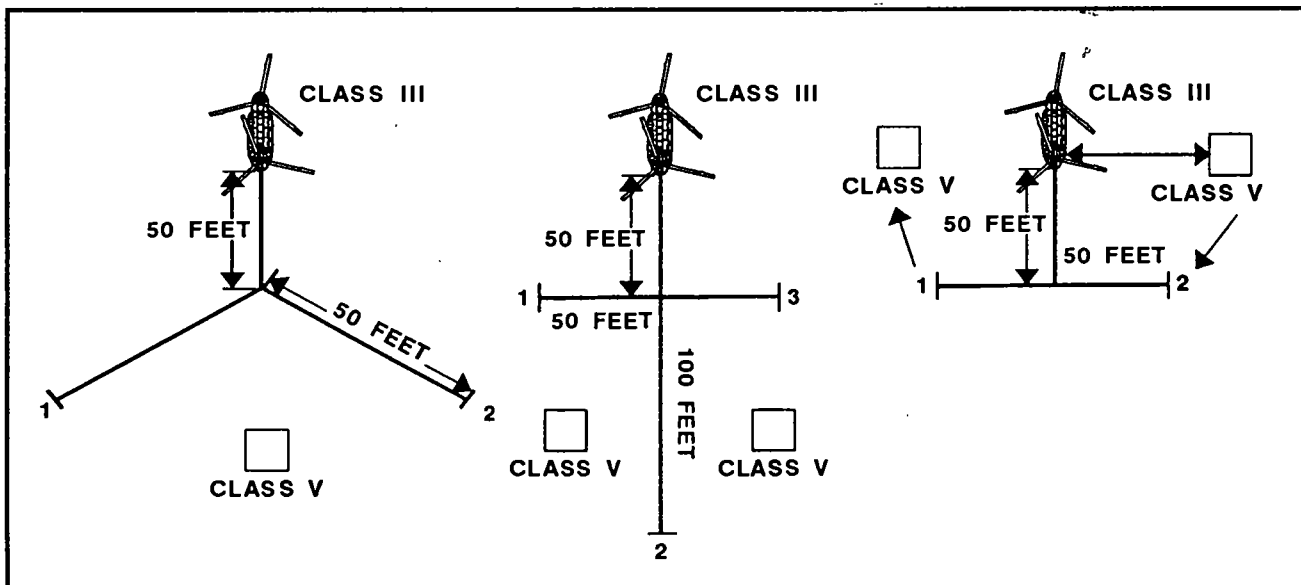


Figure B-5. Refueling point setups

(5) The operational advantages of the ERFS are discussed below.

(a) The CH-47 is an instant FARP. Once the CH-47 is on the ground, the system can be ready for refueling within a few minutes.

(b) The system can be displaced quickly. When refueling operations are completed, FARP equipment is packed up, the CH-47 takes off, and the site is cleared within minutes.

(c) The ERFS may also be pressure refueled (a maximum of 35 psi and 150 gallons per minute) for faster turnaround missions.

(d) The Fat Cow is especially useful for special operations.

(6) The operational disadvantages of the ERFS are discussed below.

(a) The ERFS is airworthy when it is installed, operated, and maintained as described in TM 55-1560-307-13&P. With this configuration, however, fuel can leak into the cabin and a catastrophic incident can occur in the event of a hard landing or an accident. When the noncrashworthy ERFS is installed, the potential for fires during a crash increases.

(b) Only the number of personnel needed to perform the mission will be on board the aircraft. Personnel on board the aircraft must be seated and wear a lap belt.

(c) The M60Ds on the CH-47 provide limited protection. Therefore, advance planning must be considered when reconnaissance and/or attack elements are to be used to escort a CH-47 with the ERFS installed.

(d) A safety hazard may be created if the blades are turning on the aircraft during refueling.

(e) The CH-47 burns a tremendous amount of fuel; this must be planned for logistically.

(f) The signature of the CH-47 makes the operation vulnerable to detection and attack.

(7) Similar refueling operations can be accomplished with the UH-60. The FARE is carried inside the aircraft while the two blivets are sling loaded. Advantages and disadvantages that apply to this operation also apply to the ERFS operation. (Refer to TM 55-1560-307-13&P for additional information.)



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APPENDIX C**FARP OPERATIONS ANNEX TO A TACTICAL SOP**

The FARP provides forward arming and refueling support necessary to conduct tactical operations. The FARP organization is comprised of the POL and ammunition section and maintenance contact team. Figure C-1 shows an example of a FARP operations annex to a tactical SOP. Figures C-2 through C-9 show enclosures 1 through 8 to the FARP operations annex. (Figures C-2 through C-7 are shown on pages 21 through 27; Figure C-8 and C-9 are shown on pages 27 through 29.)

1. EQUIPMENT

a. HEMTT FARP. Two HEMTTs will be placed on-line, and one will remain in reserve. Enclosure 1 shows the layout of a HEMTT FARP. The FARE FARP will be configured similarly to the HEMTT FARP.

b. FARP Layout. The standard FARP layout for simultaneous rearming and refueling operations will be configured as shown in Enclosure 2.

2. SITE SELECTION

a. Use tree lines, vegetation, terrain folds, and reverse slopes to mask the FARP.

b. Do not collocate the FARP with the TOC or unit trains.

c. Consider the following:

- (1) The number and type of aircraft to be refueled.
- (2) The minimum spacing requirement of 100 feet between refueling points (180 feet for CH-47).
- (3) Adequate obstacle clearance for a safe takeoff and landing.
- (4) Designated holding areas for waiting aircraft.

Figure C-1. Example of a FARP operations annex to a tactical SOP

3. WORK PRIORITIES

a. Security.

(1) Establish a perimeter and prepare fighting positions and range cards.

(2) Sweep the site for NBC contamination and set up NBC equipment.

(3) Reconnoiter the site for appropriate refuel and rearm points.

(4) Set up crew-served and air defense weapons to protect the site.

NOTE: FARP personnel must maintain security throughout occupation of the site unless other personnel are attached specifically to provide security.

b. Communications. Upon arrival, the FARP NCOIC will establish communications with the TOC, giving the closing report and anticipated time of operation. This communication will be on a secure net.

c. Setup.

(1) Determine positions of refuel and rearm points (100 feet separation for all aircraft except the CH-47).

(2) Prepare the necessary aircraft standard loads of ammunition.

(3) Reposition vehicles into final parking locations.

d. Vehicle Maintenance. Perform PMCS on vehicles and give DA Forms 2404 (Equipment Inspection and Maintenance Worksheet) to motor pool operations.

e. Camouflage. Camouflage all vehicles and equipment.

f. Other Maintenance. Perform PMCS on radios, NBC equipment, weapons, and platoon equipment.

g. Resupply. Resupply ammunition and fuel if necessary.

Figure C-1. Example of a FARP operations annex to a tactical SOP (continued)

h. Mess, Personal Hygiene, and Rest. These are accomplished after mission-essential duties are completed.

4. SECURE RADIO

a. The FARP will have an operational FM radio. This radio is used only under the following circumstances:

- (1) Resupplies are requested.
- (2) The site is under attack.
- (3) The FARP is not operational.
- (4) A serious incident occurs in the FARP; for example, a fire or an aircraft accident.

b. Outbound aircraft can relay critical messages from the FARP to the TOC. This prevents enemy detection of the FARP by radio transmissions.

5. AIRCRAFT PROCEDURES

a. Landing.

(1) When 5 kilometers from the FARP, the AMC will make a call in the blind on the administrative/logistics frequency stating that he is inbound to the FARP. An example of a call is "T14 (FARP), this is T56 (AMC) with five on blue." The AMC is telling the FARP that five aircraft are inbound on the Blue route. This alerts the FARP and other aircraft of his intentions. The FARP does not reply unless the area is not safe or secure. Terms which violate OPSEC will not be used; for example, "aircraft," "inbound," "outbound," and "FARP."

(2) Aircraft will be flown at NOE within 3 kilometers of the FARP. Approaching aircraft must maintain visual contact with departing aircraft.

b. Positioning.

(1) FARP personnel will use standard hand and arm signals to assist pilots in positioning aircraft into refuel and rearm points.

Figure C-1. Example of a FARP operations annex to a tactical SOP (continued)

(2) Pilots will not point aircraft weapons at personnel or equipment after aircraft depart the "Y" for refueling or rearming.

(3) Pilots will position their aircraft at the refuel points so that the CCR nozzle is on the right side of the aircraft.

6. REFUELING PROCEDURES

An inspection of fuel, gas, and equipment will be conducted according to the brigade accident prevention program.

NOTE: Authority to conduct open-port refueling rests with the commander.

a. Hot Refueling.

(1) Ensure that a 100-foot separation exists between refueling points.

(2) Ensure that armament systems are on SAFE or OFF.

(3) Stabilize the aircraft at flat pitch and deplane all passengers before conducting refueling operations. Although no transmissions are permitted except during an emergency, monitor all communications.

(4) Ground the closed circuit refueling nozzle (when used) to a grounding rod and bond it to the aircraft.

NOTE: FARP personnel and crew chiefs will wear protective equipment, including eye and hearing protection and gloves while refueling operations are being conducted. The fire extinguisher will be manned by FARP personnel or by a crew member, if available.

(5) Ensure that the cap is secured and the grounding cable is disconnected before the aircraft takes off.

(6) Turn the strobe lights off before refueling the aircraft and back on before it takes off (day only).

Figure C-1. Example of a FARP operations annex to a tactical SOP (continued)

b. Emergency Procedures.

(1) The POL operator will immediately shut down the pump on the tanker or the pump on the FARE or HEMTT.

(2) Whoever is tending the nozzle will remove it from the aircraft and, if the fire is small, attempt to put it out using the available fire extinguishers. **The first priority is crew safety.**

(3) Aircraft that are not directly involved will be flown to their respective holding areas.

(4) If the situation permits, every attempt will be made to remove the tanker from the scene of the fire. If time permits, ensure that all butterfly valves and elbow couplers are closed on the FARE with the 500-gallon collapsible drums (if one is in use).

(5) At the first opportunity, notify the TOC and maintain communications between the FARP and the TOC by whatever means available.

(6) After all of the above procedures are complete, personnel will move to a safe distance.

7. REARMING OPERATIONS

The standard refueling/rearming line will consist of eight points and the maintenance point. The maintenance point will be located where it will not interfere with normal operations.

a. Equipment.

(1) Maintenance point. This point will be equipped as follows:

(a) One fire extinguisher and a ground rod with cable.

(b) One standard toolbox.

(c) Two pallets for down-loading rockets and 30-mm ammunition.

Figure C-1. Example of a FARP operations annex to a tactical SOP (continued)

(d) Special tools as determined by the maintenance officer in charge.

(e) Spare parts.

(2) Rearm points. Each rearm point will be equipped as follows:

(a) One standard toolbox.

(b) One metric toolbox (AH-64 only).

(c) One fire extinguisher and a grounding rod with cable.

(d) One uploader/downloader (AH-64 only).

(e) One wing mike cord.

(f) Two pallets for rockets.

b. Personnel Requirements. Each FARP will include the following:

(1) One noncommissioned officer.

(2) One line safety officer.

(3) One officer in charge.

(4) Three armament personnel (preferred); two armament personnel (minimum) for each rearm pad.

(5) A contact team (maintenance point only).

c. Procedures.

(1) Aircraft will be armed or dearmed according to the appropriate aircraft operator's manual.

(2) When all armament switches on the aircraft are off, the pilot will turn off the anticollision light.

Figure C-1. Example of a FARP operations annex to a tactical SOP (continued)

(3) After the anticollision light is off, armament personnel will ground the airframe and install the wing store jettison pins and chock the wheels, as applicable. Then they will plug in their headsets and establish communication with the aircrew. No radio transmissions will be made during loading/downloading operations.

(4) The aircrew will assist and monitor armament personnel conducting loading/downloading operations.

(5) Ground crews will load subsystems inboard to outboard, remaining clear of the front of the systems and the backblast areas.

(6) When the loading is completed, the ground crew removes all safety pins and moves away from the aircraft.

(7) The pilot will turn on the anticollision light after the weapon system is armed. He will then depart the rearm point.

d. Aircraft Departure.

(1) The departure heading will be as briefed, or right turns will be executed after the takeoff.

(2) All takeoffs will be at minimum airspeed.

(3) Vehicles or other aircraft will not be overflown.

8. AIRCRAFT CONTROL AND SAFETY

a. Refuel nozzles will be marked with a red/orange light source attached to the grounding rod.

b. The landing area will be marked with either beanbag lights or chemical lights. Hot rocks which have been heated in cans will also be used, if necessary.

c. While in the FARP, aircraft position lights will be placed on steady bright or dim. However, they will be turned off if the tactical situation requires it or if NVG are in use.

d. Ground guides will guide aircraft into and out of refueling points using white wands or chemical lights in a color other than green.

Figure C-1. Example of a FARP operations annex to a tactical SOP (continued)

e. Ground guides will not stand in front of the aircraft weapon system at any time.

f. Aircraft position lights will be flashed to alert ground guide that the aircraft is ready to refuel or to depart.

g. The pilot will signal to the refueler to stop refueling the aircraft.

h. Radio transmissions will not be made within 100 feet of refuel or rearm points.

i. Pilots will ensure that personnel are clear and all grounding clips and cables are removed prior to takeoff.

j. Any incident involving a fire or suspected fuel contamination will close the FARP until the safety officer has investigated the incident and authorizes further operations.

k. Personnel will receive instruction on refueling operations. They will refuel three aircraft under supervision before performing refueler duties.

9. EXTENDED RANGE FUEL SYSTEM (FAT COW) OPERATIONS

a. Storage.

(1) Secure all 600-gallon tanks on an asphalt or concrete hardstand that is away from aircraft and ground vehicle operation.

(2) Statically ground all tanks at the storage area.

(3) Store all ERFS equipment, such as the pump board, fuel lines, and tiedown straps, in the ERFS storage cases provided by the shipping facility. Ensure that the storage area is enclosed and well-ventilated.

(4) Empty the 600-gallon tanks before storage (except for residual fuel in the bottom of the tanks).

(5) Drain all fuel supply lines of excess fuel before storage.

(6) Defuel aircraft according to TM 55-1560-307-13&P and the unit SOP.

Figure C-1. Example of a FARP operations annex to a tactical SOP (continued)

b. Preventive Maintenance Checks and Services. All PMCS criteria for the ERFs is covered in TM 55-1560-307-13&P.

(1) Each unit should develop a program for PMCS storage when the ERFs is not installed on the aircraft.

(2) To maintain a high readiness level for each ERFs system, the unit should conduct a monthly PMCS and an inventory.

(3) DA Form 2404 should be used for recording PMCS, faults, and corrective actions. (These forms will be maintained by the appropriate flight platoon.)

c. Installation and Operation. The installation and operation of the ERFs is covered in TMs 55-1520-240-10 and 55-1560-307-13&P.

(1) When the ERFs is installed on the aircraft, enter the following statement on the DA Form 2408-13-1 (Aircraft Inspection and Maintenance Record): Aircraft allowed to operate with ERFs installed according to TM 55-1560-307-13&P, dated 11 December 1990.

(2) All system faults will be recorded on DA Form 2408-13-3 (Aircraft Technical Inspection Worksheet).

(3) When the ERFs is removed, all faults will be reentered on the system's existing or new DA Form 2404.

NOTE: A status symbol is required in block 16 of DA Form 2408-13-1. As long as the system is installed on the aircraft, the entry will be entered again after each flight.

d. Shipment. When the ERFs is being shipped separately and not intended for self-deployment, it will be prepared for shipment for mission use according to all regulations, both Army and Air Force.

Figure C-1. Example of a FARP operations annex to a tactical SOP (continued)

e. Premission Planning for the Air Assault FARP.

(1) The standard crew for the air assault FARP mission is two pilots, two qualified crew members, and two 76Ws (POL refuelers). The number of crew members may be increased as the mission or the commander dictates.

(2) Commanders will ensure that crew members and POL refuelers are trained on crew duties before they conduct refueling operations.

f. Mission Equipment. Equipment requirements are divided between two sections. The unit assigned the mission will supply one or more CH-47s, the ERFS system with FARE attachments, and one 50-foot suction hose (pot hose). It will also supply one grounding rod with a grounding cable for the aircraft and all the necessary ground covers, tie-down ropes, and ALSE equipment. The battalion POL section will supply all of the items shown in Figure C-4 and one extra 100-GPM pump, one of each type of refueling nozzle, and one 50-foot refueling hose.

NOTE: The mission unit will install the required number of tanks according to TM 55-1560-307-13&P and Figure C-5. If the mission is conducted at extended ranges, this includes the installation of the ERFS FMCP.

(1) Hoses and fittings. The Army uses the cam-lock fitting and the unisex (dry-lock) fitting. The unisex is the preferred fitting because it reduces fuel spillage during assembly and disassembly and it is self-grounded when connected.

(2) Pump system. If the 250-GPM self-contained pump system is used, the filter separator can be dropped from the equipment list and the pump placed in the 100-GPM position (Figure C-4). The size of the pump prevents a spare pump from being loaded.

(3) Nozzles. Two types of nozzles are used. The D-1 single-point nozzle is used on CH-47Ds; the CCR nozzles with attachments are used on all other aircraft, unless the D-1 is specified.

Figure C-1. Example of a FARP operations annex to a tactical SOP (continued)

g. Site Selection.

(1) The LZ must be large enough to accommodate FARP aircraft with no less than 150 feet between supported aircraft refueling points.

(2) Multiship FARP aircraft will be separated with no less than 300 feet between aircraft. This allows for the 150-foot separation between supported aircraft refueling points.

(3) The FARP site must also serve as the assembly area and takeoff area for the supported units.

(4) An additional site should be considered if the current site is also being used for rearming.

(5) Planners should consider the tactical advantages of the site to include the distance to the FARP, stability of the FARP, the required time on station, camouflage, and security requirements. They should also consider wind direction and the type of aircraft to be refueled.

h. Site Layout.

(1) For daytime operations, the landing point will be designated and marked with standard visual signals and markers.

(2) For night operations, the landing point will be designated and marked with a chemical light or tactical "Y".

(3) Refueling points and equipment will be set up as shown in Figure C-4.

(4) The extra 100-GPM pump will be placed beside the operating pump.

(5) For ease of replacement, all spare pieces of equipment will be placed so they are readily accessible.

(6) Each FARP aircraft will be grounded to its own grounding point.

(7) The 100-GPM pumps and filter separator will be grounded as shown in Figure C-4.

Figure C-1. Example of a FARP operations annex to a tactical SOP (continued)

(8) Emergency equipment, such as a five-gallon water can and a fire extinguisher, will be placed at the pump station and the refueling points.

i. Fire Extinguishers. All fire extinguishers must have current inspection tags and seals. Authorized fire extinguishers must be one of the following:

- 20-pound Halon 1211.
- 20-pound (KH CO3) Purple K.
- 15-pound CO2.

j. Blade Ropes and Tail Cone Covers.

(1) Blade ropes. FARP aircraft will have at least two blade ropes installed and secured (one on each rotor system).

(2) Tail cone covers. Engine tail cone covers will be installed to prevent FOD to the engine and to keep the rotors from turning.

k. Crew Duties.

(1) Pilot in command.

(a) The PC is in charge of the FARP operation. The PC is usually the senior officer on the mission; he directs all operations and monitors the safety of the FARP setup and refueling operations. He ensures that the FARP is set up according to the SOP and that all required points are grounded.

(b) The PC's station is at the fuel pump, which enables him to monitor all phases of the operation. The PC is responsible for turning off the fuel supply at the pump in the event of a mishap or an emergency.

(2) Copilot. The copilot will assist in marshaling and fire guard duties and any other duty that the PC assigns.

Figure C-1. Example of a FARP operations annex to a tactical SOP (continued)

(3) Flight engineer. The FE is responsible for safely loading the aircraft before the mission and unloading it after the aircraft is shut down. He also controls the fuel flow from inside the aircraft. In addition, the FE is responsible for cutting off the fuel supply from inside the aircraft in the event of a mishap or an emergency.

(4) Crew chief. The crew chief will assist in setting up the refueling points. He will also assist with marshaling and fire guard duties.

(5) POL refuelers. Refuelers are responsible for setting up the FARP and the actual refueling operations. They will be the only individuals allowed to start the pumps.

(6) Additional aircrew members. If additional aircrew members are needed, they will be assigned tasks by the PC and/or the FE.

1. Standard Flight Equipment. Crew members will use standard flight equipment. POL refuelers will use safety equipment and clothing as stated in the SOP and the appropriate regulations.

m. FARP Operations.

(1) Aircraft position. When aircraft arrive at the refueling point, a marshaller positions the first aircraft at the first point and the second aircraft at the second point. This procedure continues in chalk order for all aircraft. All aircraft will remain in position until they all have been refueled, then they will be repositioned to the assembly/takeoff area.

(2) Fuel transfer. Fuel will be transferred from the internal tanks in the same manner as if the tanks were being self-deployed. Four-tank fuel transfer will be completed as follows: To maintain the CG of the aircraft, a four-tank fuel-transfer sequence will be 4, 1, 3, and 2; a three-tank sequence will be 3, 1, and 2.

Figure C-1. Example of a FARP operations annex to a tactical SOP (continued)

(3) Auxiliary power unit. The aircraft APU will not be operated during refueling operations. Use of the APU is authorized only during aircraft run-up and shutdown and during emergencies.

(4) Mission operation checklist. A mission operation checklist is shown in Figure C-8.

n. Emergency Procedures During Nontactical Situations.

(1) Fire in the refueling area. In case of fire in the refueling area, personnel should--

- Stop refueling at all points.
- Turn all pumps off.
- Close all valves.
- Evacuate personnel from the area.
- Evacuate aircraft from the area.
- Attempt to fight the fire.
- Notify higher command, if possible.

(2) Fire on supported aircraft. In case of fire on board supported aircraft, personnel should--

- Stop refueling at all points.
- Turn all pumps off.
- Close all valves.
- Evacuate personnel from the aircraft that is on fire.
- Attempt to shut down the aircraft that is on fire.
- Evacuate all other aircraft from the area.
- Attempt to fight the fire.
- Notify higher command, if possible.

Figure C-1. Example of a FARP operations annex to a tactical SOP (continued)

(3) Fire on FARP aircraft. In case of fire on board FARP aircraft, personnel should--

- Stop refueling at all points.
- Turn all pumps off.
- Close all valves.
- Evacuate personnel from the aircraft that is on fire.
- Attempt to shut down the aircraft that is on fire.
- Evacuate all other aircraft from the area.
- Attempt to fight the fire.
- Notify higher command, if possible.

(4) Fuel leaks. In case of fuel leaks, personnel should--

- Stop refueling at the affected refueling point.
- Turn all pumps off.
- Turn the valves to the leak off.
- Repair or replace the affected pieces.
- Open valves and start the pumps.
- Check for additional leaks.
- Proceed with refueling operations.

o. Emergency Procedures During Tactical Situations. If the FARP site is under attack or under a threat of being overrun--

- Stop refueling.
- Evacuate supported aircraft.
- Disconnect FARP aircraft from the system by disconnecting the 50-foot pot hose from inside the aircraft.
- Abandon the system and evacuate the FARP area.

Figure C-1. Example of a FARP operations annex to a tactical SOP (continued)

NOTE: The mission commander will brief all personnel on emergency procedures before the FARP mission begins.

p. Preflight Procedures. Preflights will be conducted according to the operator's manual, the appropriate TM, and this SOP.

q. Safety. All safety aspects must be considered during the planning and execution phases of the air assault FARP mission, and special safety considerations must be given night operations. The unit commander sets the safety limitations depending on the actual mission; however, safety will not be sacrificed for mission completion during training.

r. Environmental Factors. Environmental factors, such as local water tables, wildlife, and agriculture, will be considered during the planning and execution of the air assault FARP mission.

NOTE: FM 10-68, FM 21-60, TM 55-1560-307-13&P, the appropriate aircraft operator's manual, and the appropriate aircraft checklist contain more information on planning and executing the air assault FARP mission.

s. Self-Deployment Capability.

(1) Planning. Planning information and guidance for self-deployment is found in FM 1-109.

(2) Equipment. Equipment for the self-deployment mission is the standard ERFS as outlined in TM 55-1560-307-13&P.

(3) Responsibilities. Each company commander must maintain the equipment needed to self-deploy. He must also ensure that personnel are properly trained in the use of self-deployment equipment and ALSE.

10. AQUA-GLO TEST PREPARATION PROCEDURES

a. Put a fully charged battery into the meter assembly. (A fully charged battery will operate the ultraviolet light for about one hour. About 30 tests can be performed on one charge.)

Figure C-1. Example of a FARP operations annex to a tactical SOP (continued)

b. Turn the ultraviolet lamp assembly upside down and open the test pad slot. Using tweezers, take the recalibration standard pad and put it, colored side in toward the lamp, in the test pad slot. Do not touch the pad with your fingers; always handle it with the tweezers. Turn the lamp assembly right side up.

c. Slide the meter assembly into the tracks on the ultraviolet lamp assembly.

d. Recalibrate the meter assembly after each battery change and before each working day as follows:

(1) Turn the ultraviolet lamp on by pushing the lamp switch to ON and by holding the switch down for ten seconds. When the switch is pushed down, a high-pitched sound is emitted that should drop to a low-pitched sound when the pressure on the switch is released. These sounds indicate that the lamp is on. If the pitch of the sound does not drop when the pressure is released on the switch, the battery needs to be recharged.

CAUTION

Do not leave the switch in the ON position if the red battery test indicator light stays on. If you do, the battery will be ruined and cannot be recharged. If the red light stays on, remove the battery and recharge it.

(2) Move the lever on the lamp assembly across its scale to the set number indicated on the recalibration standard pad. For example, if the set number on the pad is 5.3, move the lever to 5.3. Hold the hooded meter switch button in for about 30 seconds until the pointer above the meter scale becomes steady and holds its position.

(3) If the meter pointer does not point to zero, unscrew the plug screw on the side of the meter. Use the small screwdriver provided with the kit to adjust the meter so that the pointer points to zero.

Figure C-1. Example of a FARP operations annex to a tactical SOP (continued)

(4) Take the recalibration standard pad out of the test pad slot, using the tweezers, and put it back in the kit pocket.

e. Wipe the green glass light filters with a clean, soft cloth or paper towel.

11. FUEL SAMPLING PROCEDURES

a. Couple the detector pad holder assembly, with the toggle valve closed (parallel to the line), to the sampling coupler. The detector pad holder assembly includes plastic tubing, detector pad holder, toggle valve, and sampling coupler.

b. Flush the detector pad assembly as follows:

(1) Put the end of the plastic tubing in a container that will hold more than a gallon of fuel.

(2) Open the toggle valve by turning the handle up (at a right angle to the line).

(3) Let about a gallon of fuel flow through the assembly into the container.

(4) Close the toggle valve and uncouple the detector pad assembly.

c. Unscrew the two halves of the detector pad holder. Using the tweezers, take a detector pad out of its envelope and put it, yellow side out, in the recess in the outlet side of the pad holder. Screw the pad holder assembly back together. Do not open the pad envelope until you are ready to put the pad in the holder. Do not touch the pad with your fingers; always use the tweezers. The pad can absorb moisture from the air and from skin, causing the test results to be false.

d. Couple the detector pad holder assembly back to the sampling coupler, with the toggle valve closed, and put the end of the plastic tubing into the neck of the plastic sampling bottle.

e. Open the toggle valve and allow 500 milliliters of fuel to flow into the sample bottle. Close the valve.

Figure C-1. Example of a FARP operations annex to a tactical SOP (continued)

f. Uncouple the detector pad holder assembly from the sampling coupler, and unscrew the detector pad holder. Slip one prong of the tweezers into the notch in the pad holder, and lift the test pad out.

g. Press the wet test pad between dry paper towels or blotters to remove the excess fuel. Press down on the pad firmly, move the pad with the tweezers to a dry place on the towel or blotter, and press again. Do this several times.

12. FUEL TEST PROCEDURES

a. Use the tweezers to lift the damp test pad off the towel or blotter, and put it in the test pad slot in the bottom of the ultraviolet lamp assembly. Ensure that the yellow side faces the ultraviolet lamp.

b. Turn on the lamp.

c. Push in on the hooded button of the meter assembly with your left hand. Watching the meter scale, move the lever of the ultraviolet lamp assembly with your right hand until the meter points to zero.

d. Release pressure on the hooded button and shut off the lamp switch as soon as the meter pointer settles to zero. The meter pointer should stabilize in about one minute.

e. Take the reading from the scale behind the lever at the point where the lever is. With a 500-milliliter sample, this scale reads directly into parts per million of water in the fuel. If the reading is 9 ppm or below, the test is finished and the fuel may be used. If the reading is 10 ppm (the lever is at 10) and the meter will not point to zero, follow these procedures:

(1) Repeat the procedures in paragraph 10a through d.

(2) Open the toggle valve and allow 100 milliliters of fuel to flow into the sample bottle. Close the valve.

(3) Repeat the procedures in paragraph 11 and then a through d above.

Figure C-1. Example of a FARP operations annex to a tactical SOP (continued)

f. Take the reading from the scale behind the point where the lever is. Multiply that reading by 5 to find the parts per million of water in the sample. For example, if the scale reading is 3, there are 15 ppm of water in the fuel. (The maximum reading with the Aqua-Glo test for a 100-milliliter sample is 60 (5 times 12).) A 100-milliliter sample is the smallest that will give an accurate test result.

g. Take the fuel and the fuel system equipment out of service immediately if the fuel on retest shows more than 10 ppm of water. Follow the guidance in FM 10-68 for inspecting and testing the fuel and equipment.

Figure C-1. Example of a FARP operations annex to a tactical SOP (continued)

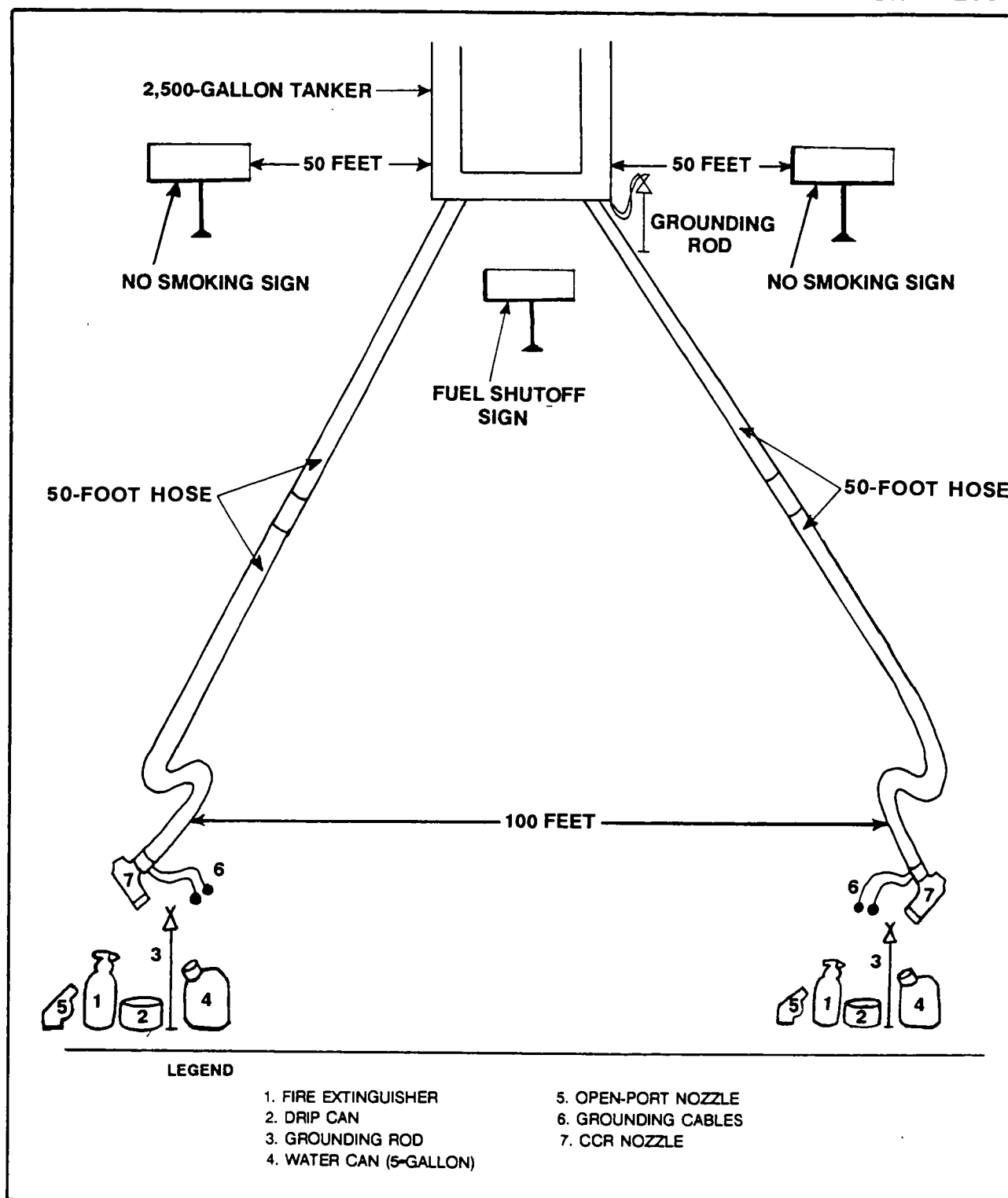
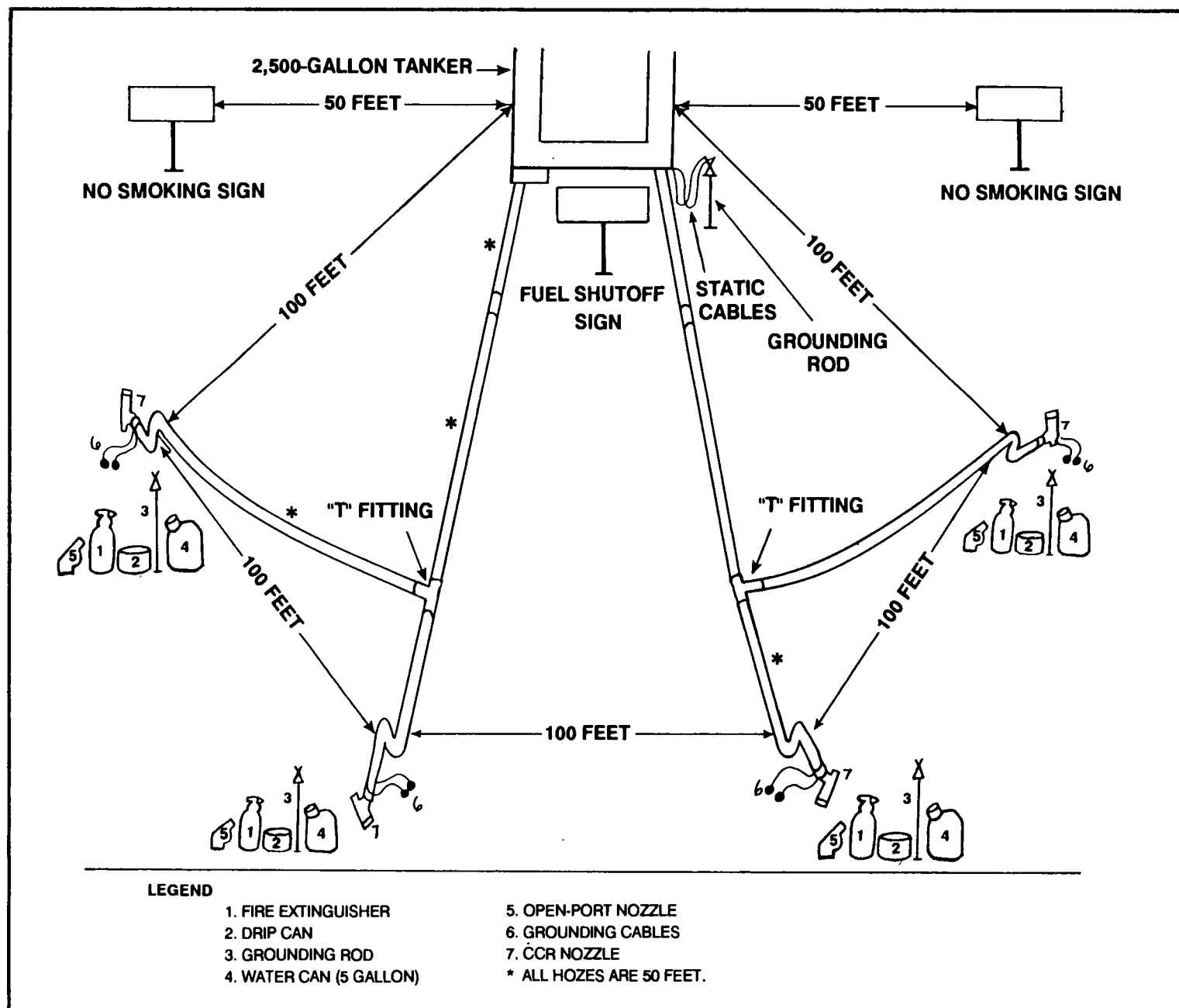


Figure C-2. Enclosure 1 to the FARP operations annex to a tactical SOP

Figure C-3. Enclosure 2 to the FARP operations annex to a tactical SOP



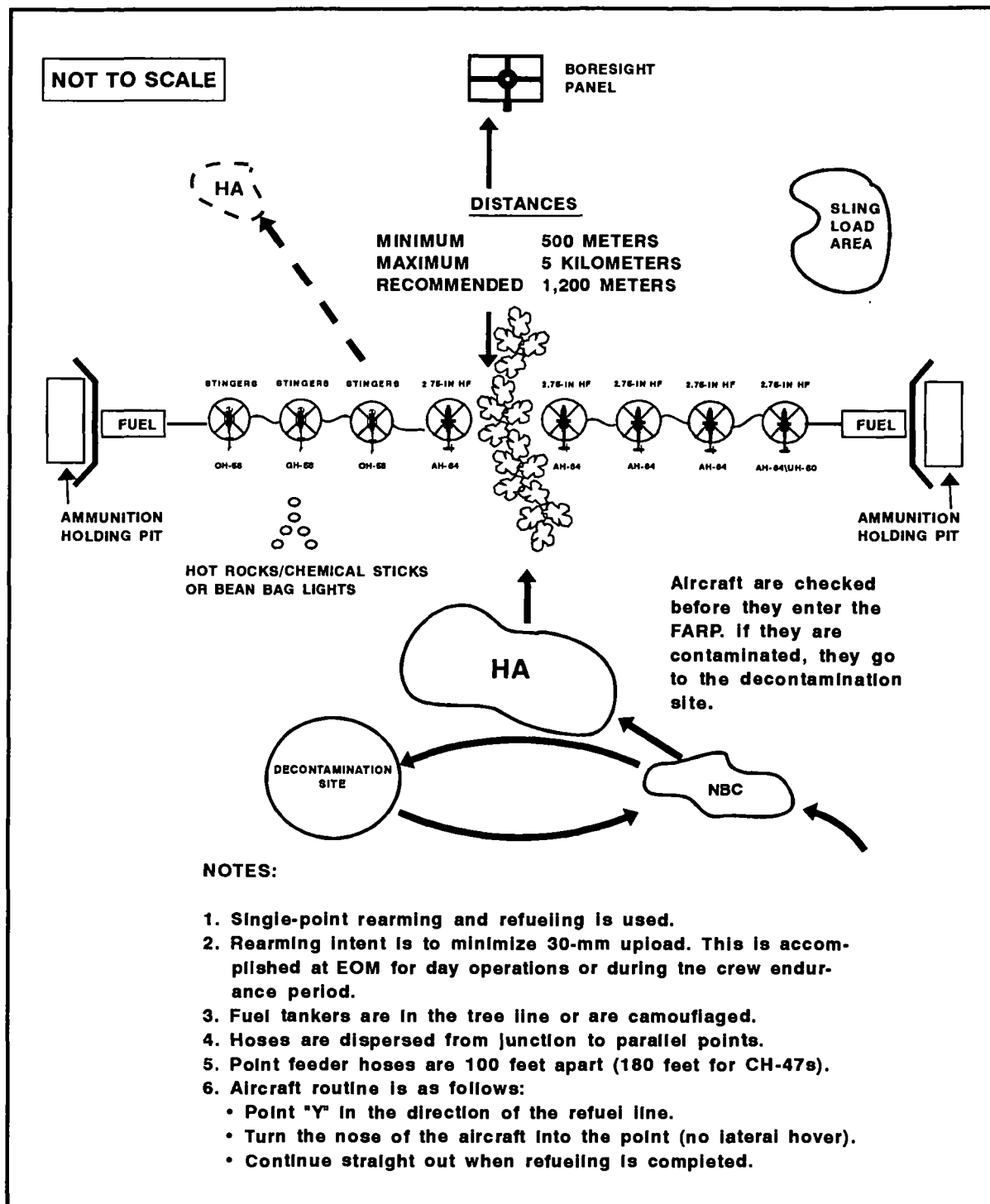


Figure C-4. Enclosure 3 to the FARP operations annex to a tactical SOP

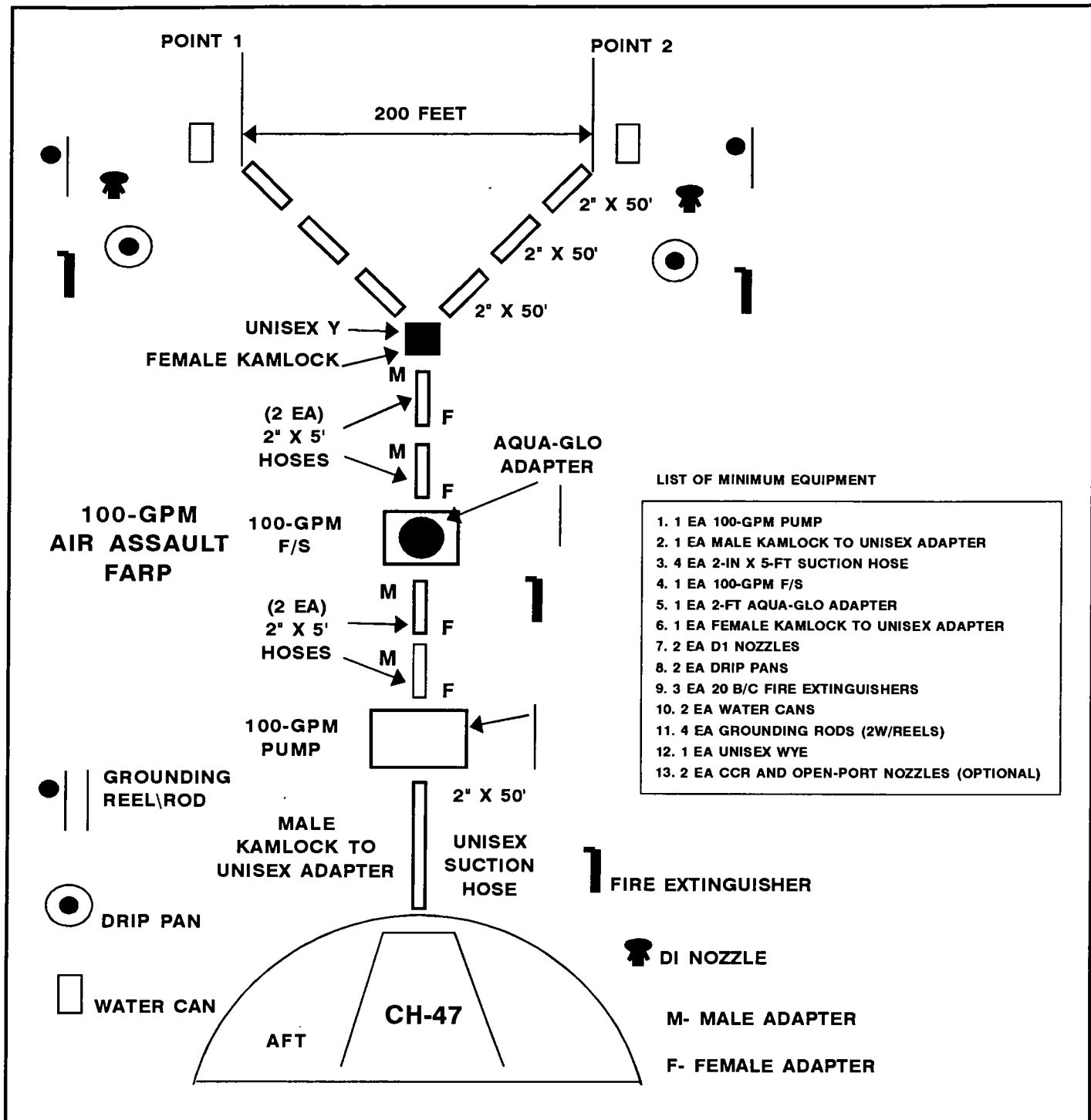
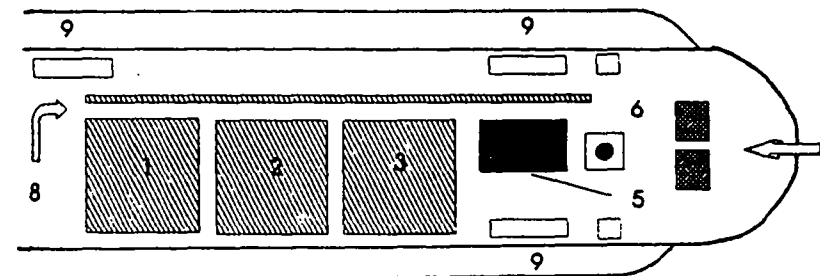
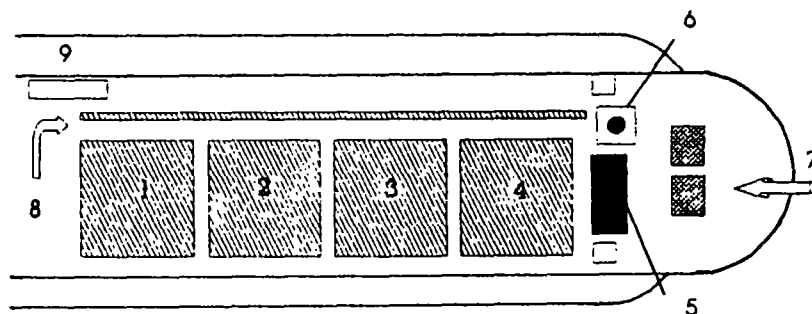


Figure C-5. Enclosure 4 to the FARP operations annex to a tactical SOP

**THREE-TANK INSTALLATION****FOUR-TANK INSTALLATION**

NO	ITEM
1 THROUGH 4	INTERNAL TANKS (ERFS)
5	FARE EQUIPMENT
6	FILTER SEPARATOR
7	100-GPM OR 250-GPM PUMP
8	50-FOOT POT HOSE
9	ACCESSIBLE TROOP SEATS

Figure C-6. Enclosure 5 to the FARP operations annex to a tactical SOP

**EXTENDED RANGE FUEL SYSTEM OPERATIONAL CHECKLIST
PREFLIGHT INSPECTION**

1. Before applying electrical power for system operation, perform the checks and services listed in the PMCS, Table 2-6, TM 55-1560-307-13&P.
2. Check all fuel manifold lines, electrical lines, grounding cables, and vent lines for installation, security, and chafing.
3. Check the tank tie-down strap for security and chafing.
4. Check to ensure that the ERFs tank is properly serviced (maximum of 580 gallons per tank). Confirm that the vent lines are uncapped when fuel is in the tank.
5. Take a fuel sample from each tank.
6. Apply power to the ERFs with the APU or with the aircraft engines running.
7. Open the appropriate tank cam levers (dump valves) one at a time.
8. Perform power-on checks as follows:
 - a. Check the operation of the press-to-test indicator lights.
 - b. Turn on Pump #1 and hold it on until the pump engages. Ensure that the ON light illuminates and the pump is running. Turn Pump #1 off, and ensure that the pump shuts off.
 - c. Check to ensure that each pump switch remains engaged after the pressure switch indicates that all pumps are operating. Allow at least a 10-second delay between each pump switch actuation. Turn all pump switches off when the fuel transfer is verified.
 - d. Ensure that the press-to-test fuel low-level light indicates one minute of fuel remains in the tank.
 - e. Turn the override switch to ON, then momentarily turn on any one pump. Check to ensure that the pump is operative. If it is not, the override switch is defective.

Figure C-7. Enclosure 6 to the FARP operations annex to a tactical SOP

**EXTENDED RANGE FUEL SYSTEM OPERATIONAL CHECKLIST
PREFLIGHT INSPECTION (continued)**

- f. Check to ensure that all system circuit breakers are in when the power is on.
- g. Check the entire system for fuel leaks.
- h. Verify that all pump switches are off.
- i. Close all tank cam levers.

Figure C-7. Enclosure 6 to the FARP operations annex to a tactical SOP (continued)

**EXTENDED RANGE FUEL SYSTEM FUEL TRANSFER CHECKLIST
FUEL TRANSFER CHECKLIST**

NOTE 1: To maintain aircraft CG, the tank burn sequence should be 4, 1, 3, 2.

NOTE 2: After all of the aircraft ground checks have been completed, ensure that there is positive fuel flow from the ERFS to the aircraft.

1. Open the cam lever for the appropriate tank.*
2. Turn the forward auxiliary fuel switches off.
3. Turn the aft auxiliary fuel switches off.
4. Place the fuel selector switch to the main tank having the lowest amount of fuel.
5. Initiate fuel transfer when the main fuel tanks on the aircraft have decreased 1,000 pounds or sooner.

*These steps require a response from the flight engineer or crew chief when called for by the pilot.

Figure C-8. Enclosure 7 to the FARP operations annex to a tactical SOP

EXTENDED RANGE FUEL SYSTEM FUEL TRANSFER CHECKLIST
FUEL TRANSFER CHECKLIST (continued)

6. Turn Pumps #1 and #3 on and hold. (Allow at least a 10-second delay between each pump switch actuation.)*

7. Turn Pumps #2 and #4 on if faster fuel transfer is desired.*

8. Check all hoses and fittings for leaks.*

NOTE: Do not use liquid level indicators for continuous fuel quantity readings during flight.

9. Monitor the fuel levels in the main tanks. Turn all fuel pumps off when the main fuel tanks indicate 1,600 pounds.*

10. Transfer fuel until the low-level warning lights illuminate. Fuel pumps will shut off automatically. Confirm that the fuel pumps are off.*

11. Ensure that the cam lever is closed for the affected tank.*

12. After the refueling operation is complete, verify that all fuel pumps are off and all tank cam levers are closed.*

Figure C-8. Enclosure 7 to the FARP operations annex to a tactical SOP (continued)

**AIR ASSAULT FARP REFERENCE CHECKLIST
UPON ARRIVAL AT SITE**

1. Ensure that aircraft to be fueled can land into the wind.
2. Conduct a normal engine shutdown.

NOTE: POL personnel may start unloading and setting up equipment. Unless the CE is needed during the shutdown phase, he may assist with the FARP layout.

3. Stop engines after two minutes.
4. Ensure that the PC/FE secures the aircraft (APU to stop).
5. Ensure that the PC observes and directs the FARP site layout.
6. Ensure that the PC inspects the FARP site layout. (A safety inspection should be conducted to ensure the proper installation of FARP equipment.)
7. Check the FARP system under pressure for leaks.
8. Take a fuel sample using Aqua-Glo test procedures.
9. Record the fuel sample reading.
10. Brief FARP personnel and place them in position.
11. Commence refueling operations.

NOTE: Anyone observing an unsafe practice or procedure will alert FARP personnel. All refueling operations will cease immediately.

Figure C-9. Enclosure 8 to the FARP operations annex to a tactical SOP



1

2



3

4



APPENDIX D**LOAD PLANS**

Three primary ground vehicles are used to support FARP operations. They are the M978 HEMTT tanker, the M977 HEMTT cargo vehicle, and the M989A1 HEMAT. Efficient loading of these vehicles will facilitate smooth operations and help ensure adequate support for the mission.

D-1. HEAVY EXPANDED MOBILITY TACTICAL TRUCK TANKER

The HEMTT tanker can carry 2,500 gallons, of which 2,250 gallons are usable. When paired with the HTARS, the HEMTT tanker can simultaneously refuel four aircraft. Figure D-1 shows the front and rear views of the M978 HEMTT tanker.

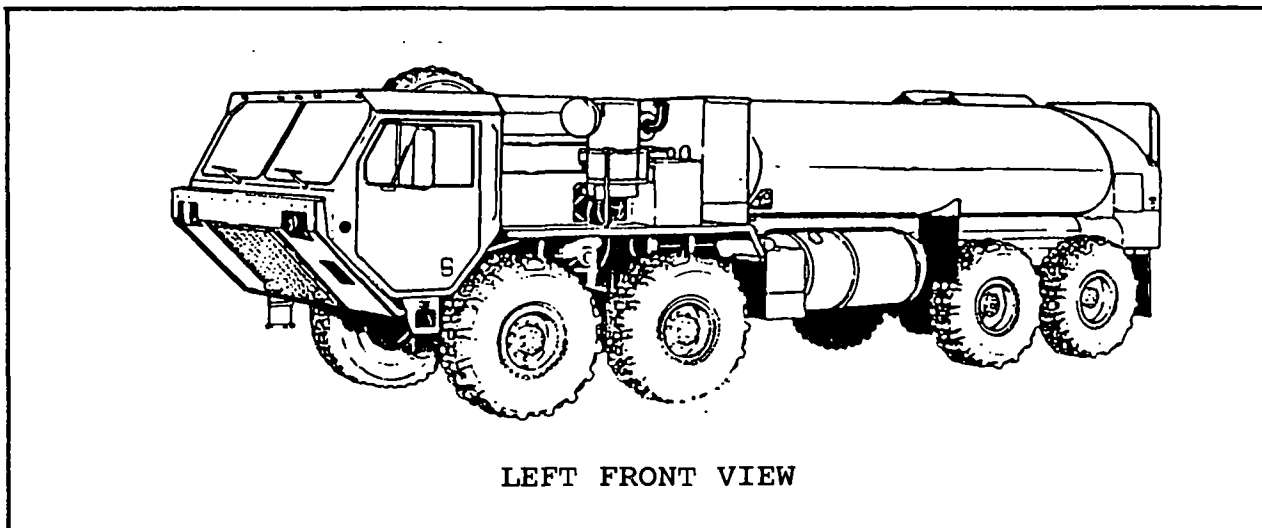


Figure D-1. M978 HEMTT tanker

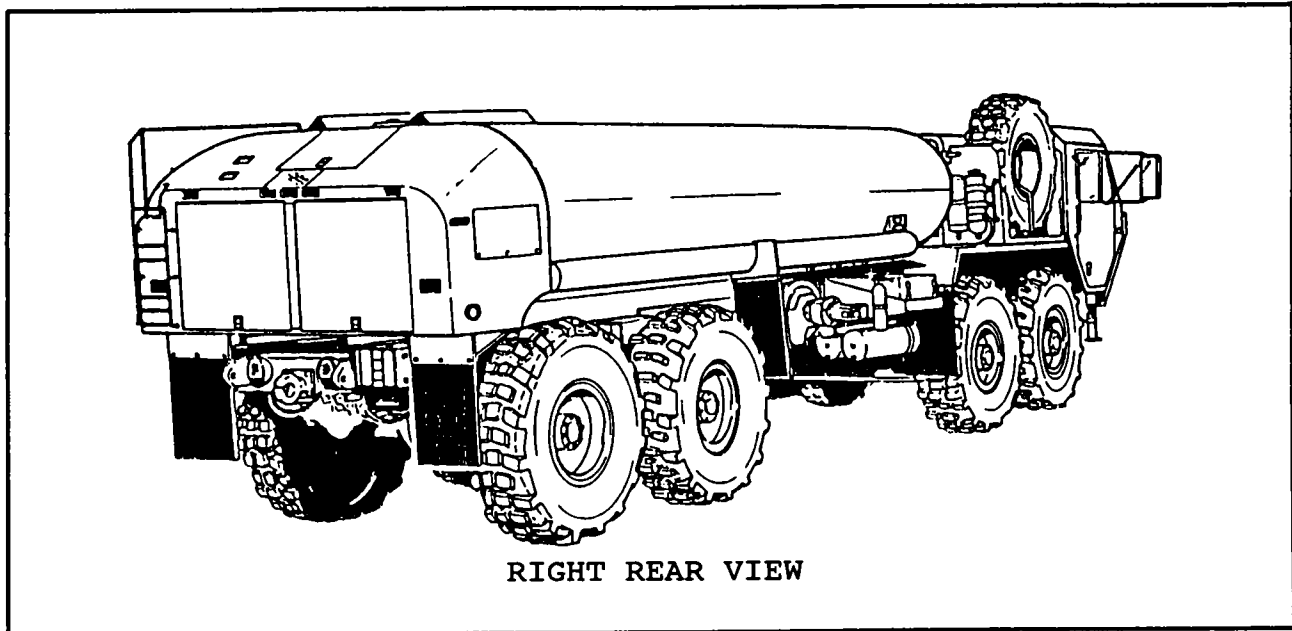


Figure D-1. M978 HEMTT tanker (continued)

D-2. HEAVY EXPANDED MOBILITY TACTICAL TRUCK CARGO VEHICLE

The HEMTT cargo vehicle is equipped with a materiel-handling crane with a 2,500-pound load capacity at a 19-foot boom radius. The 18-foot cargo body can carry 22,000 pounds. When carrying ammunition, this truck will cube out before it weighs out. Figure D-2 shows the front and rear views of the M977 HEMTT cargo vehicle.

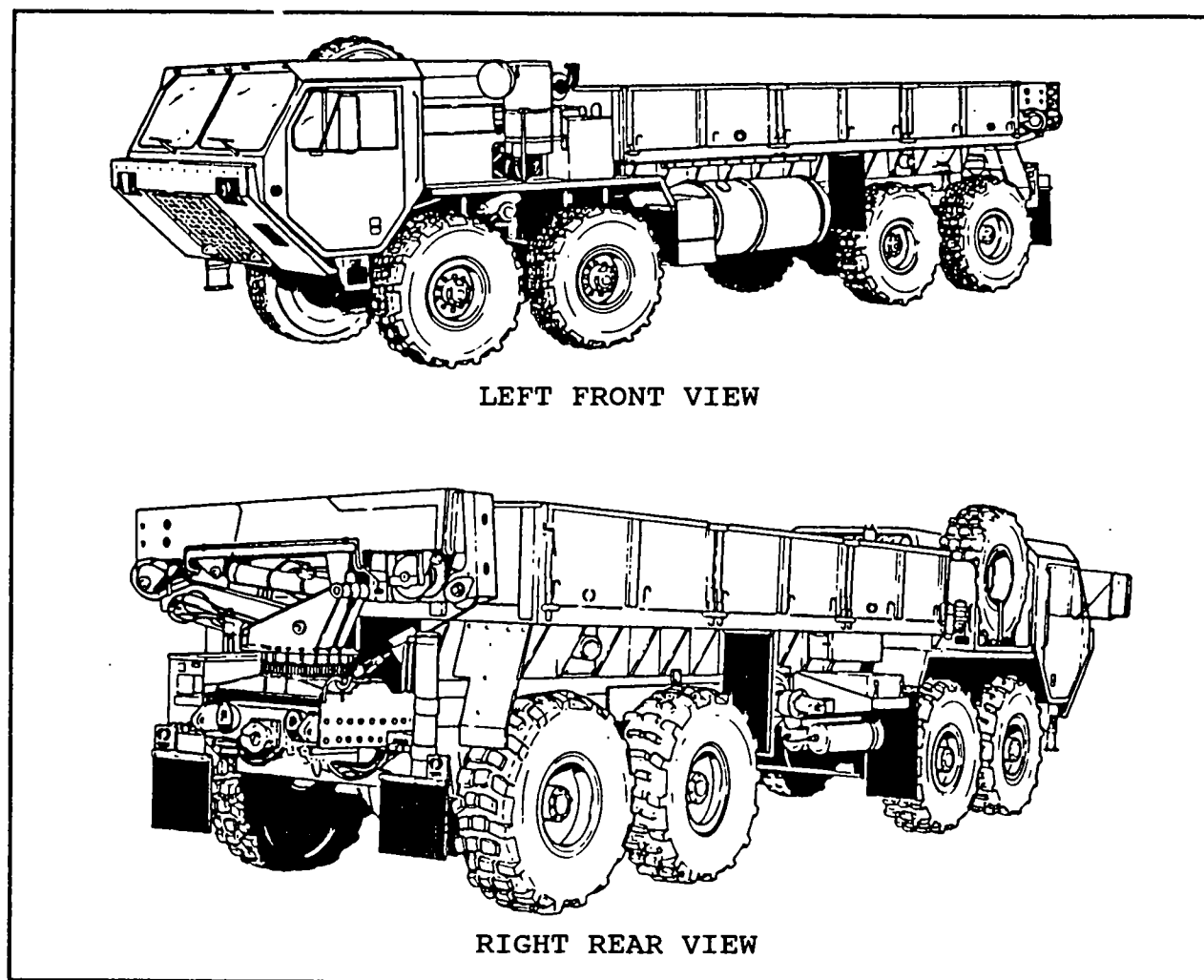


Figure D-2. M977 HEMTT cargo vehicle

D-3. HEAVY EXPANDED MOBILITY AMMUNITION TRAILER

The HEMTT is the prime mover for the HEMAT. The HEMAT can carry 22,000 pounds. Figure D-3 (page D-4) and Figure D-4 (page D-5) show the M989A1 HEMAT. Figures D-5 through D-7 (pages D-6 through D-8) show suggested ammunition load plans.

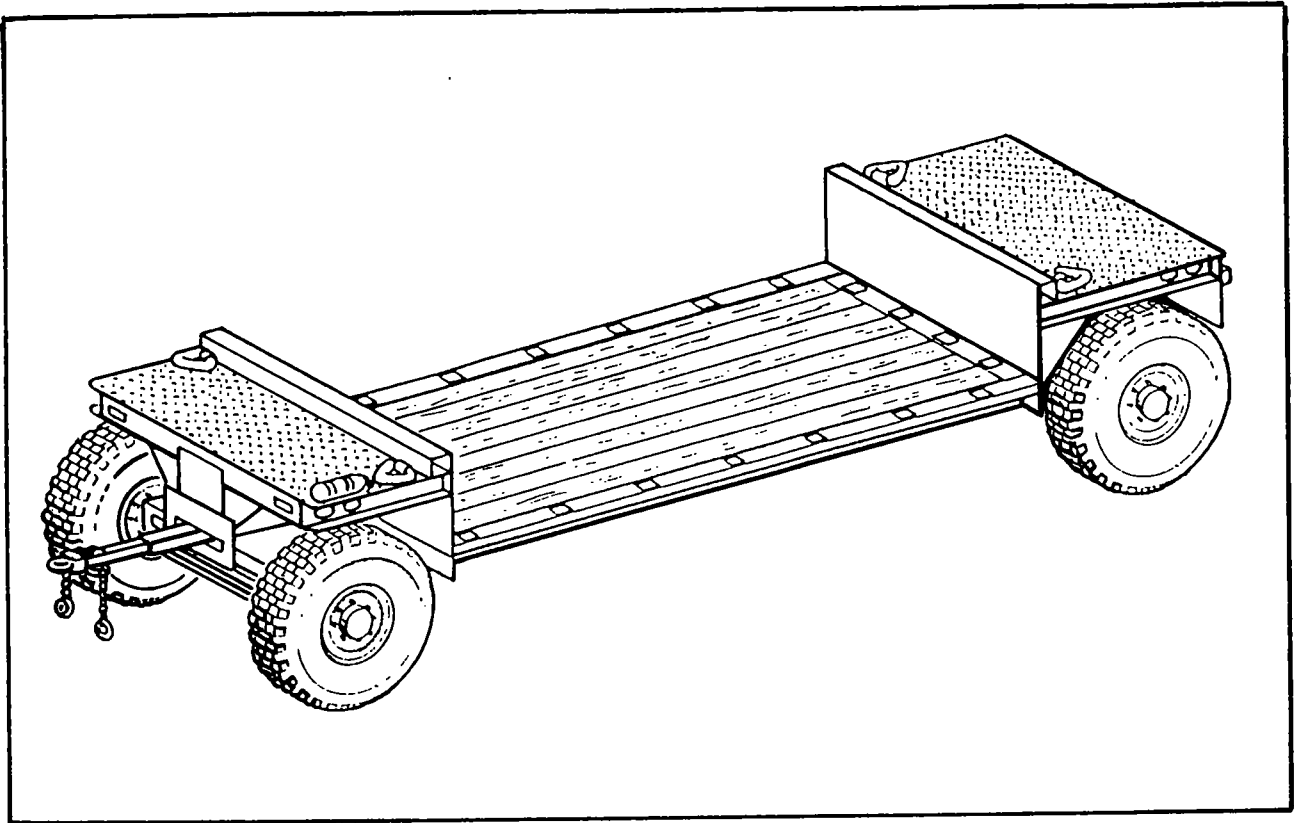


Figure D-3. M989A1 HEMAT

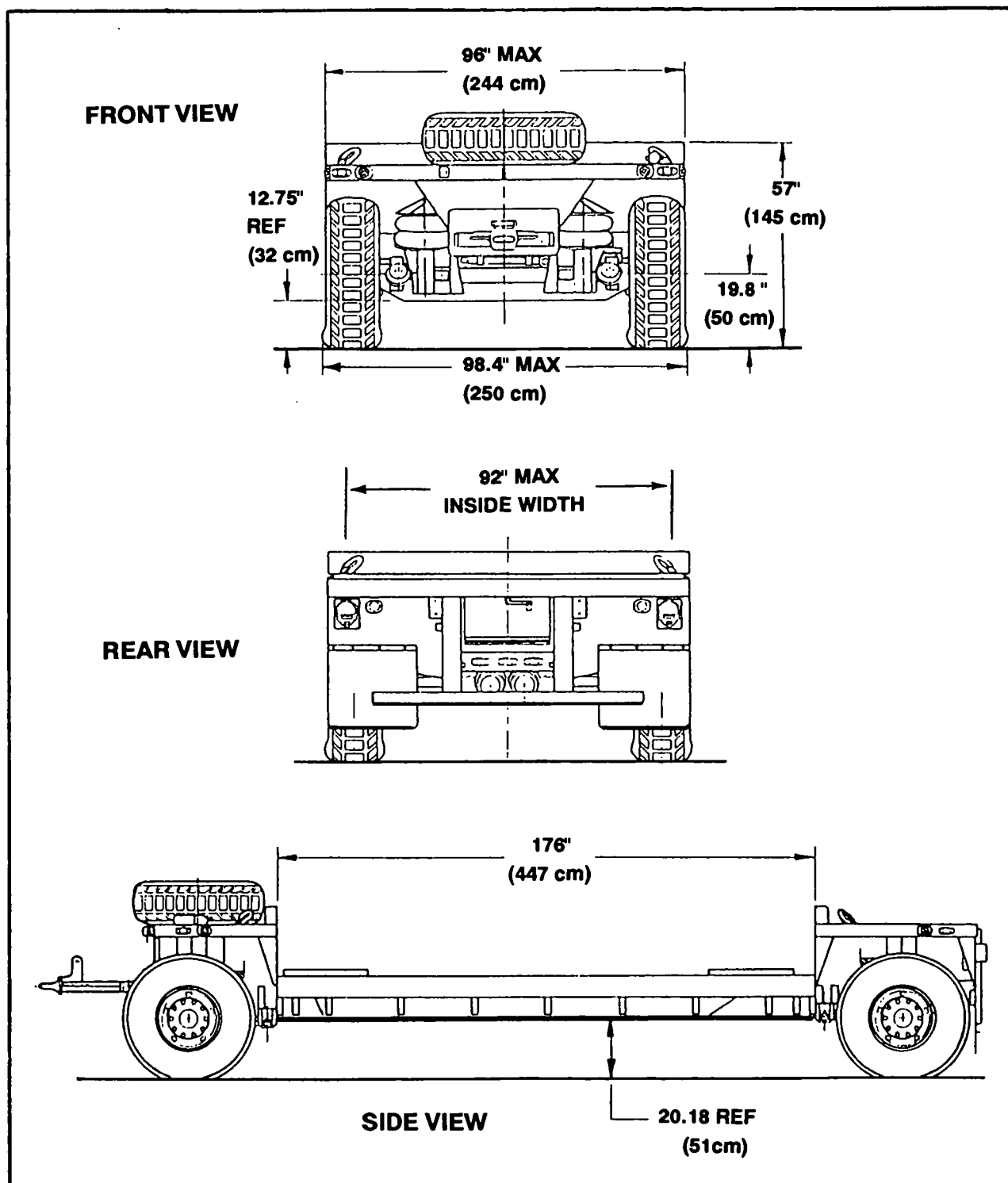
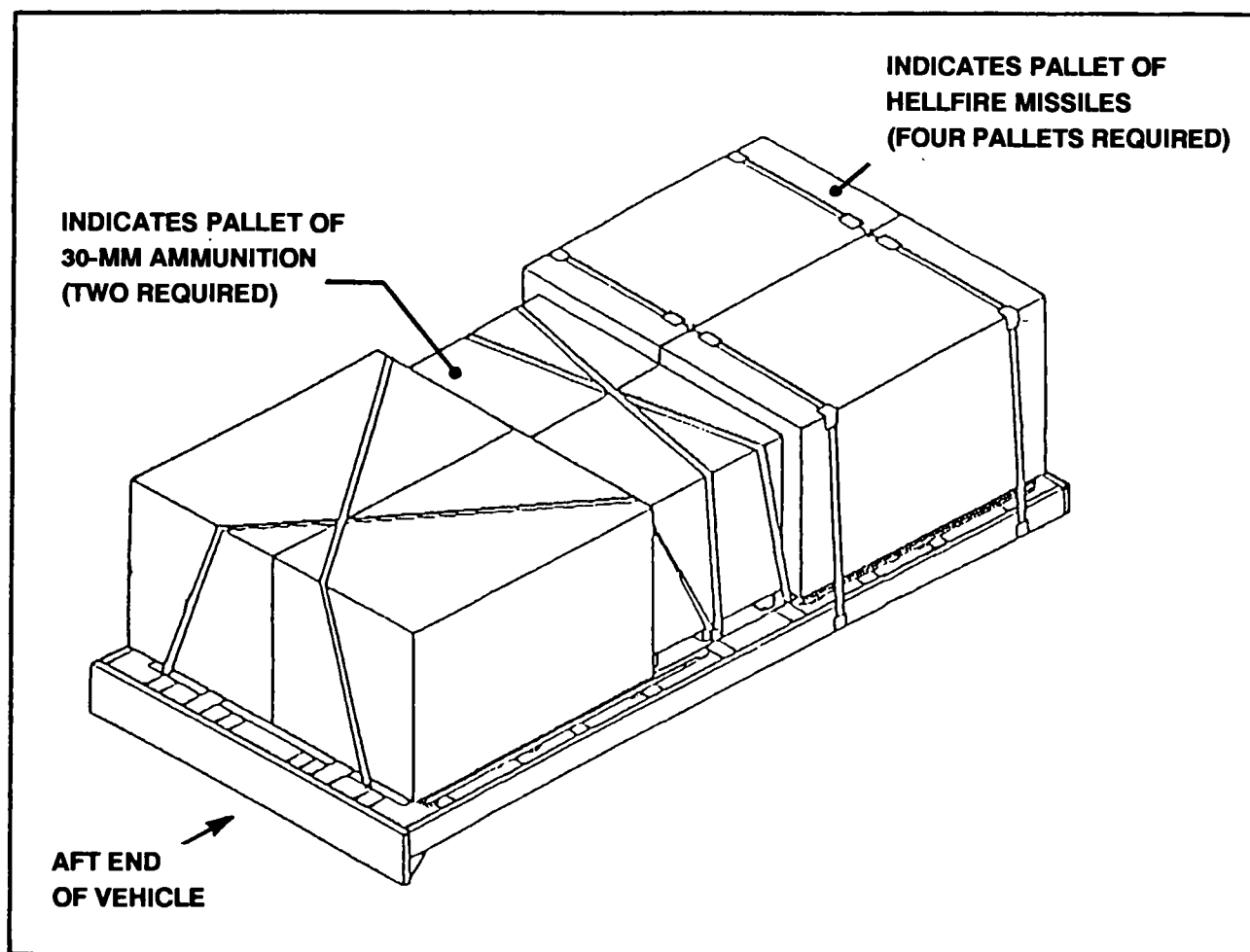
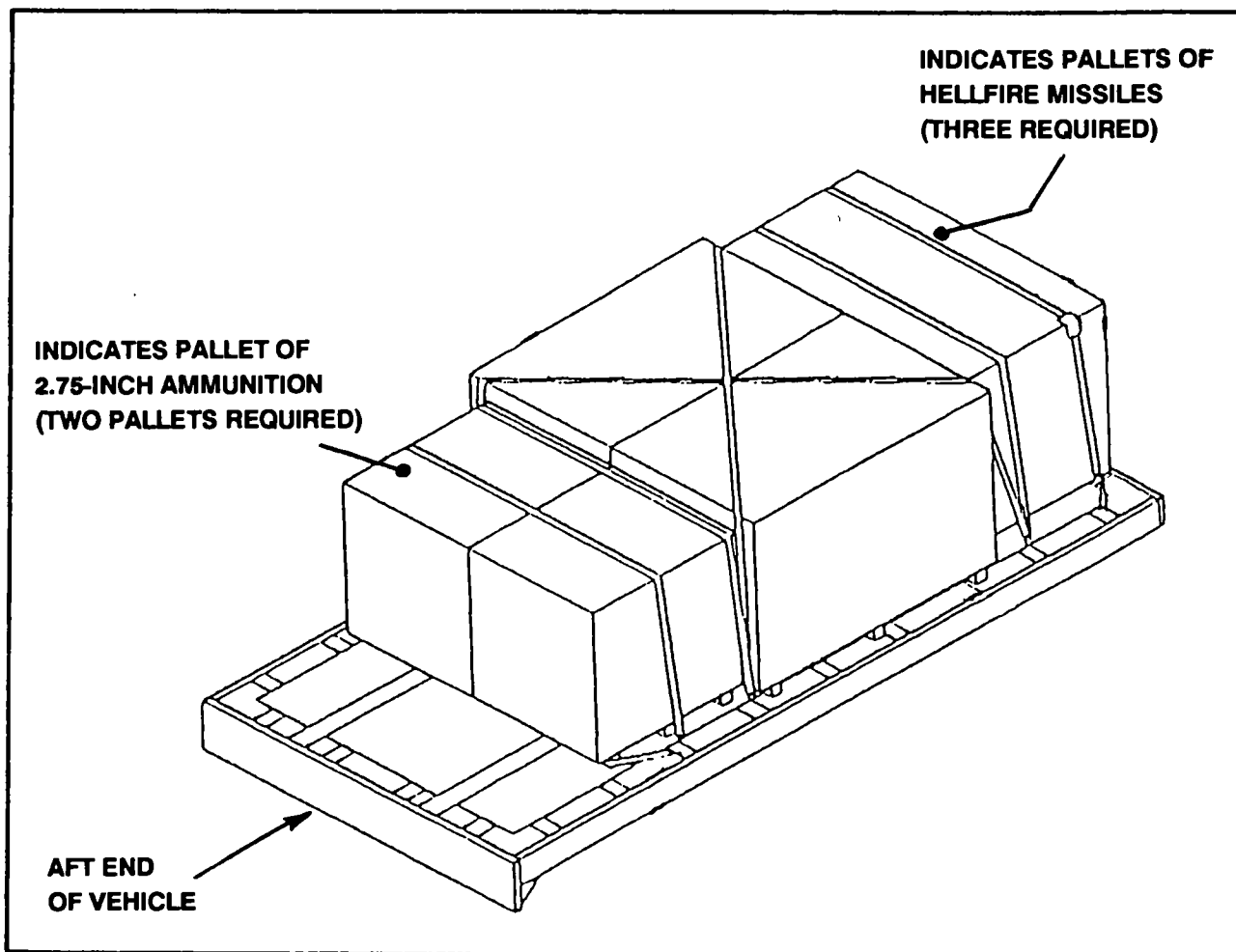


Figure D-4. Dimensions of the M989A1 HEMAT



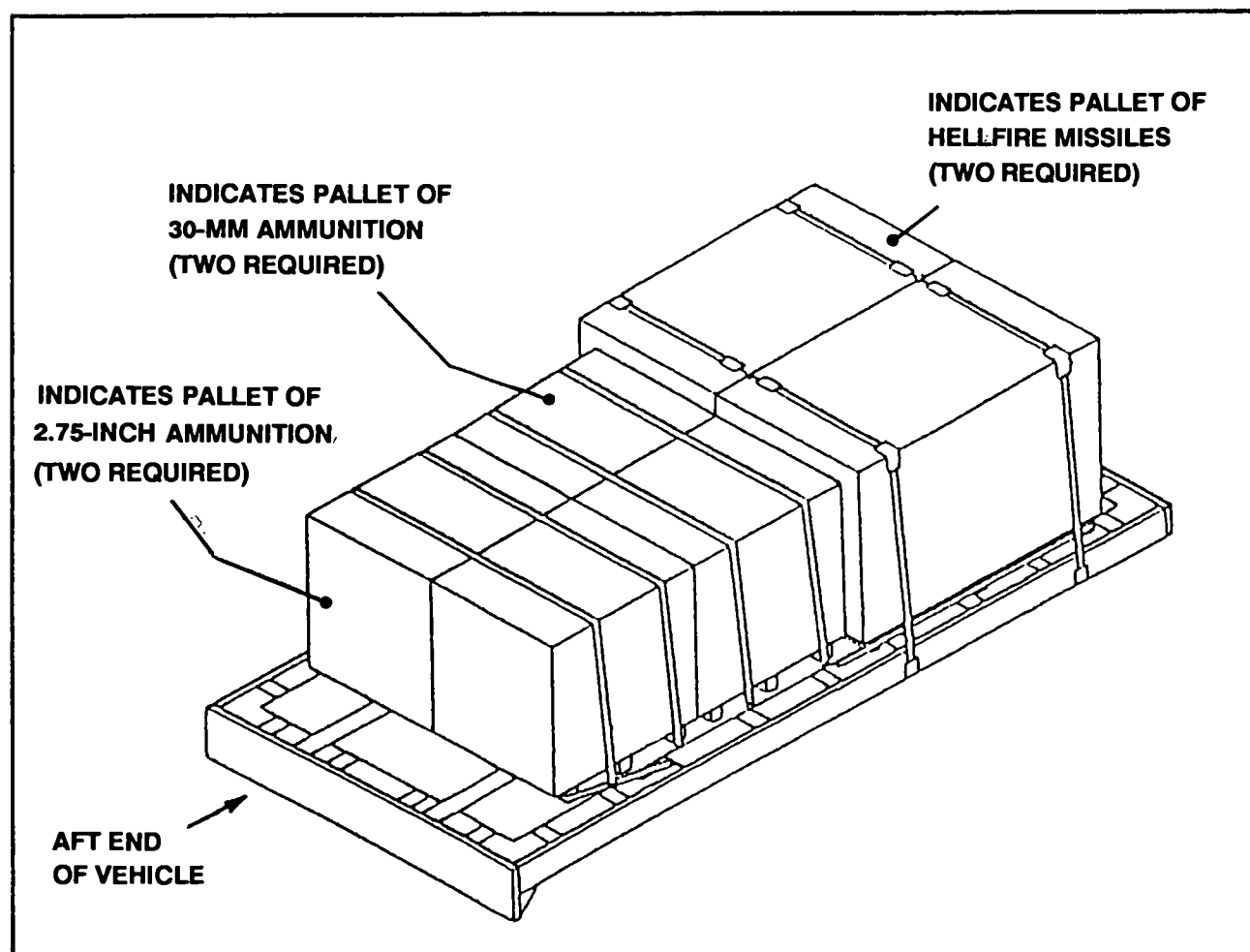
ITEM	QUANTITY	APPROXIMATE WEIGHT (Pounds)
30-mm pallet	2	7,472
Hellfire pallet	4	<u>6,996</u>
		14,468

Figure D-5. Suggested ammunition load plan 1



ITEM	QUANTITY	APPROXIMATE WEIGHT (Pounds)
Hydra-70 pallet	2	5,032
Hellfire pallet	3	5,247
		<u>10,279</u>

Figure D-6. Suggested ammunition load plan 2



ITEM	QUANTITY	APPROXIMATE WEIGHT (Pounds)
Hellfire pallet	2	3,498
30-mm pallet	2	7,472
Hydra-70 pallet	2	5,032
		<u>16,002</u>

Figure D-7. Suggested ammunition load plan 3

APPENDIX E
MULTIPLE FARP OPERATIONS

Army doctrine dictates that combat operations be conducted 24 hours a day in any weather. Therefore, FARP operations must be scheduled to provide around-the-clock support. The best way to provide support is to incorporate two or more FARPs in a planned sequence. A schedule which includes two or more FARPs ensures that one FARP is always active, reduces personnel fatigue, and facilitates efficient resupply.

E-1. MISSION

The mission is to deploy the FARP forward to support an attack. Two primary sites and their alternates are designated. The scheduled operational times for FARP A are 1400, 1900, and 2200. The scheduled operational times for FARP B are 1600, 2100, and 2400. The battalion will have a jump FARP on standby in the BSA and will use the division rapid refueling point provided by the ASB for administrative and rear operations.

E-2. SUGGESTED SCHEDULE

A suggested schedule for a FARP is shown in Figure E-1. The assumption is that when the FARP is inactive a second FARP has become active. Using the same activity schedule, FARP B is deployed after FARP A. The schedule for FARP B shifts two hours; activities remain the same.

INACTIVE PHASE	
TIME	ACTIVITY
0800	FARP A deploys forward to site 1.
1000	FARP A arrives at site 1, conducts NBC survey, and begins priority of work tasks.

Figure E-1. Suggested FARP schedule

INACTIVE PHASE (continued)

TIME	ACTIVITY
1200	Priority of work tasks is completed. The NCOIC and the platoon leader or platoon sergeant reconnoiter the next site and the route to it. They also conduct a preliminary NBC reconnaissance.
1300	FARP setup begins; hoses and points are laid out.
1345	Fuel lines are charged.

ACTIVE PHASE

1400	Personnel perform FARP operations.
------	------------------------------------

INACTIVE PHASE

1500	FARP operations at site 1 completed; FARP site is taken down and movement to site 2 begins.
1630	FARP A arrives at site 2 where it is resupplied; personnel begin priority of work tasks.
1830	Priority of work tasks is completed; personnel reconnoiter the next day's FARP sites.

ACTIVE PHASE

1900	Personnel perform FARP operations.
------	------------------------------------

Figure E-1. Suggested FARP schedule (continued)

INACTIVE PHASE	
TIME	ACTIVITY
2030	First iteration of FARP operations is completed; personnel set up tents and tent camouflage.
ACTIVE PHASE	
2200	Personnel perform FARP operations.
INACTIVE PHASE	
2330	Second iteration is completed, security is posted, and the FARP rest plan begins.
0630	Personnel load the FARP equipment, eat, and perform personal hygiene.
0800	FARP A moves to that day's site 1.

Figure E-1. Suggested FARP schedule (continued)



APPENDIX F

FORWARD ARMING AND REFUELING POINT CHECKLIST

Check appropriate answer

1. SAFETY EQUIPMENT	YES	NO
a. Are fire extinguishers present, one for the pump assembly and one for each refueling nozzle? (FM 10-68, pages 4-4 and 4-5)	_____	_____
b. Do fire extinguishers meet the requirements? (FM 10-68, page 4-4, Table 4-1)	_____	_____
c. Is sufficient water available to wash fuel spills from personnel or to wet fuel-soaked clothing prior to removing the clothing? (FM 10-68, pages 7-11 and 9-2)	_____	_____
d. Are POL handlers wearing protective clothing? (FM 10-68, page 9-2)	_____	_____
e. Are explosion-proof flashlights available for night operations? (FM 10-68, page 7-5)	_____	_____
f. Are NO SMOKING, DANGER, PASSENGER MARSHALING AREA, RESTRICTED AREA, ALARM, and EMERGENCY SHUTOFF signs posted? (FM 10-68, page 9-4)	_____	_____
g. Are ignition sources collected outside the dispensing area? (FM 10-68, page 7-5)	_____	_____
h. Are grounding rods being used at pump-filter separator locations and at each dispensing point nozzle? (FM 10-68, pages 4-7 and 4-9)	_____	_____

Check appropriate answer

YES NO

- i. Do the grounding rods conform to specifications? (FM 10-68, page 7-6)

2. NOZZLES AND HOSES

- a. Does each nozzle have proper grounding cable and handling wire attached? (FM 10-68, page 4-9, Figure 4-4)

- b. Are both closed-circuit and open-port nozzles available for use? (FM 10-68, page 4-18)

- c. Are dust covers attached to the nozzle and are they used? (FM 10-68, page 4-14)

- d. Has the hose been tested at normal operating pressure with the nozzle closed? (FM 10-68, page 4-13)

- e. Is the dispensing hose long enough to allow minimum required distance between aircraft? (FM 10-68, page 4-22, Table 4-3)

- f. Do hoses show signs of blistering, saturation, nicks, or cuts? (FM 10-68, page 4-12)

- g. Are hose nozzle screens clean? (FM 10-68, page 4-13)

- h. Are the hoses configured in a curved pattern? (FM 1-104, page 4-3, and Figure 4-1, page 4-4)

3. AIRCRAFT CONTROL AND EQUIPMENT

- a. Is the parking area for each fuel dispensing point clearly marked? (FM 10-68, page 8-9)

Check appropriate answer

YES NO

- b. Is a trained air traffic controller or pathfinder available at each refueling site (nontactical environment)? (FM 10-68, page 4-13) _____
- c. Does the FARP have two-way radio communications with aircraft before and immediately after refueling (nontactical environment)? (FM 10-68, page 8-1) _____
- d. Is the refueling site equipped with a lighting system for night operations? (FM 10-68, page 8-9, and FM 10-69, page 9-2, Table 9-1) _____

4. SITE PREPARATION

- a. Is the size of the site adequate for the operation? (FM 10-68, page 4-5) _____
- b. Has the area been cleared of loose sticks, stones, and other debris that might cause FOD? (FM 10-68, page 4-7) _____
- c. Does the layout ensure proper spacing between aircraft refueling points? (FM 10-68, page 4-22) _____
- d. Are all pieces of equipment and materiel that can be camouflaged covered with appropriate camouflage? (FM 10-68, page 4-7) _____
- e. Are vehicles using one set or existing track marks to reduce the number of tracks? (FM 1-104, page 4-3) _____
- f. Have the selected FARP area and perimeter been secured? (FM 1-104, pages 3-6 and 3-7) _____
- g. Are the vehicles emplaced to allow timely exit? (FM 1-104, page 4-5) _____

Check appropriate answer

	YES	NO
h. Are proper and applicable FARP decoys set up? (FM 1-104, page 4-5)	_____	_____
i. Are FARP assets dispersed appropriately? (FM 1-104, page 4-6)	_____	_____
j. Does the setup of the FARP take advantage of local vegetation, terrain, and cover to provide concealment and protection? (FM 1-104, page 4-3)	_____	_____
k. Does the setup of the FARP take advantage (if possible) of existing structures and buildings? (FM 1-104, page 4-3)	_____	_____
5. BEFORE-REFUELING OPERATIONS		
a. Are sufficient personnel assigned to the equipment--a fireguard, one person to operate the pump, and one person to operate each nozzle? (FM 10-68, page 4-13)	_____	_____
b. Has a fuel sample been taken from each dispensing nozzle and each fuel source? (FM 10-68, page 4-13)	_____	_____
c. Has the complete system been checked for proper operation, pressure, and leaks? (FM 10-68, page 5-16)	_____	_____
6. SITE OPERATION		
a. Is there an established communication means to control traffic at refueling locations? (FM 10-68, page 7-4)	_____	_____
b. Have passengers been briefed about proper dismounting/mounting procedures and do they go to the marshaling area while the aircraft is refueling? (FM 10-68, page 4-36)	_____	_____
c. Are ground guides provided for aircraft? (FM 10-68, page 8-1)	_____	_____

Check appropriate answer

	YES	NO
d. Do ground guides use proper marshaling signals? (FM 10-68, Figure 8-1)	_____	_____
e. Do nonessential personnel deplane before refueling? (FM 10-68, page 4-36)	_____	_____
f. Is the fire extinguisher carried from its position by the grounding rod to the side of the aircraft by the refueling port? (FM 10-68, page 4-13)	_____	_____
g. Do refueling personnel ensure that all radios are turned off except the radio used to monitor air traffic? (FM 10-68, page 4-14)	_____	_____
h. Do refueling personnel ensure that armament aboard the aircraft has been set on SAFE? (FM 10-68, page 4-13)	_____	_____
i. Are aircraft properly grounded before they are refueled? (FM 10-68, page 4-36)	_____	_____
j. Is the nozzle bonded to the aircraft before the refueling cap is opened? (FM 10-68, page 4-37)	_____	_____
k. Is the dust cap replaced on the nozzle after each refueling? (FM 10-68, page 4-37)	_____	_____
l. Are nozzles replaced on the nozzle hanger (grounding rod) after use? (FM 10-68, page 4-37)	_____	_____
m. Is the nozzle grounding cable attached to the grounding rod when not in use? (FM 10-68, page 4-9)	_____	_____
n. If tank vehicles are used as the fuel source for rapid refueling, is the refueling being properly conducted? (FM 10-68, Chapter 5)	_____	_____

Check appropriate answer

- | | YES | NO |
|--|-------|-------|
| o. Are refueling personnel familiar with emergency fire and rescue procedures? (FM 10-68, page 4-15) | _____ | _____ |
| p. Are refueling personnel familiar with procedures in case of a fuel spill? (FM 10-68, page 10-5) | _____ | _____ |
| q. Is a copy of the unit's refueling SOP available and are POL personnel familiar with its contents? (AR 385-95, para 1-7) | _____ | _____ |
| r. Are appropriate measures in place to facilitate reconstitution and recovery of FARP assets in the event of damage? (FM 1-104, page 4-6) | _____ | _____ |

APPENDIX G

ARMAMENT CONFIGURATIONS FOR THE AH-1, AH-64, AND OH-58C/D

The authorized armament configurations for the AH-1, AH-64, and OH-58C/D are shown in Figures G-1 through G-4. The figures are shown on pages G-2 through G-5.



RIGHT WING STORES		LEFT WING STORES	
		*	
☐		*	☐
☐	●	*	●
☐	●	*	●
☐	●	*	●
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LEGEND

✱	UNIVERSAL TURRET (M-197 20-mm AUTOMATIC GUN)
●	19-TUBE ROCKET LAUNCHER-M200A1, M227, M261
CAUTION	
The 19-tube rocket launcher is restricted to a maximum of 12 17-pound warhead rockets when mounted on out-board pylons. Refer to TM 55-1520-236-10 for restrictions on other combinations.	
●	7-TUBE ROCKET LAUNCHER-M156., M260
☐	TOW MISSILE M65-TWO LAUNCHERS (FOUR MISSILES)
☐	TOW MISSILE M65-ONE LAUNCHER (TWO MISSILES)
●	WING GUN POD-M18A1 (7.62-mm GUN)

Figure G-1. AH-1 authorized armament configurations

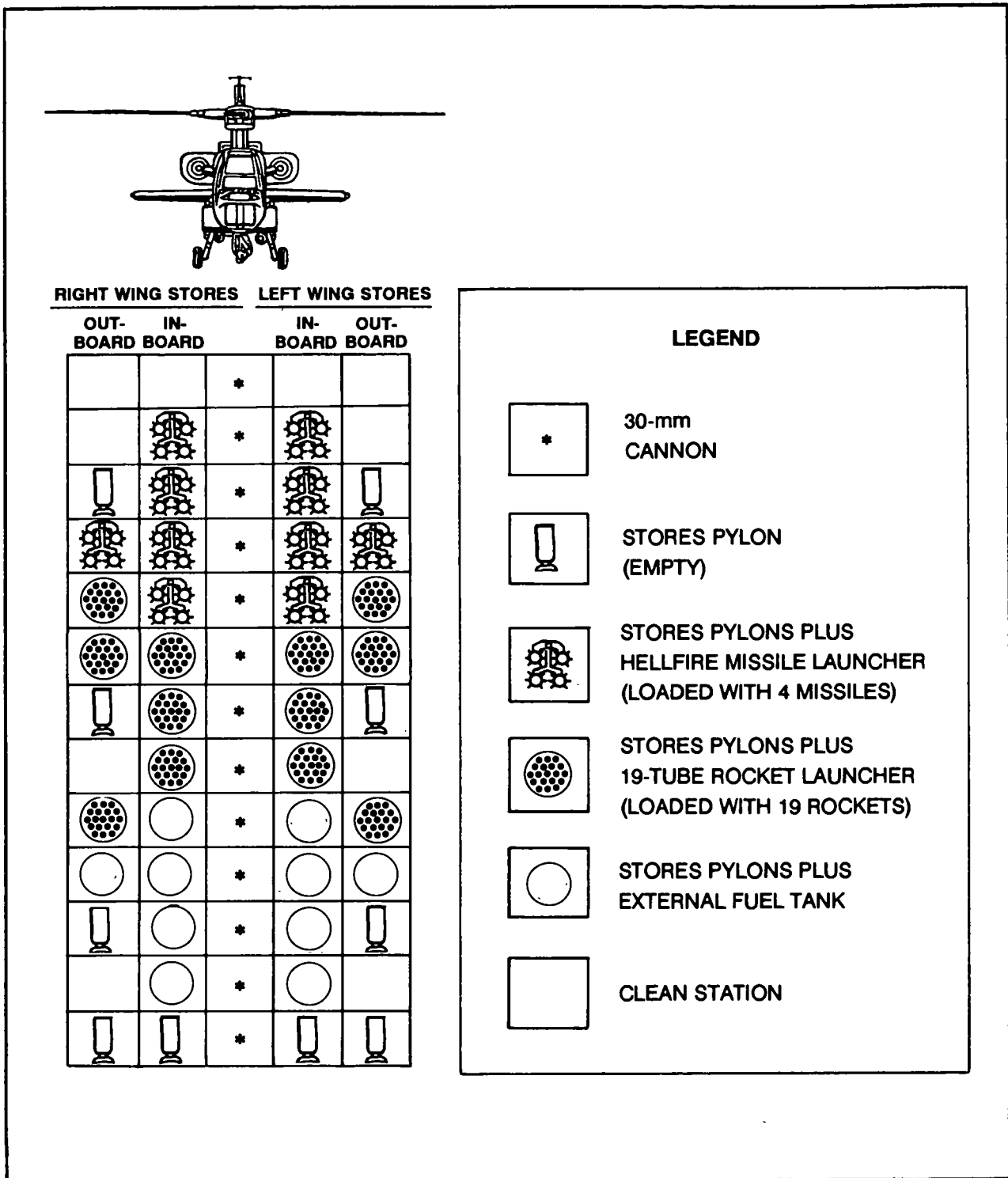


Figure G-2. AH-64 authorized armament configurations

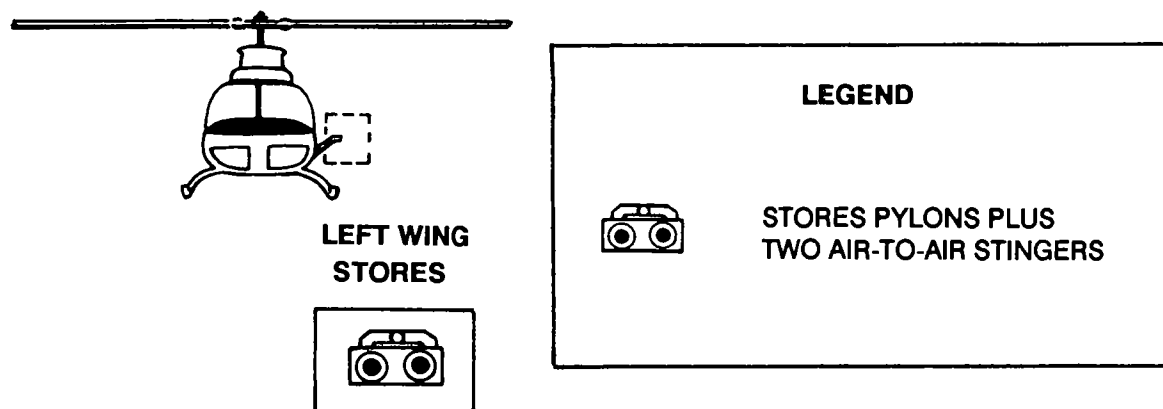


Figure G-3. OH-58C authorized armament configuration

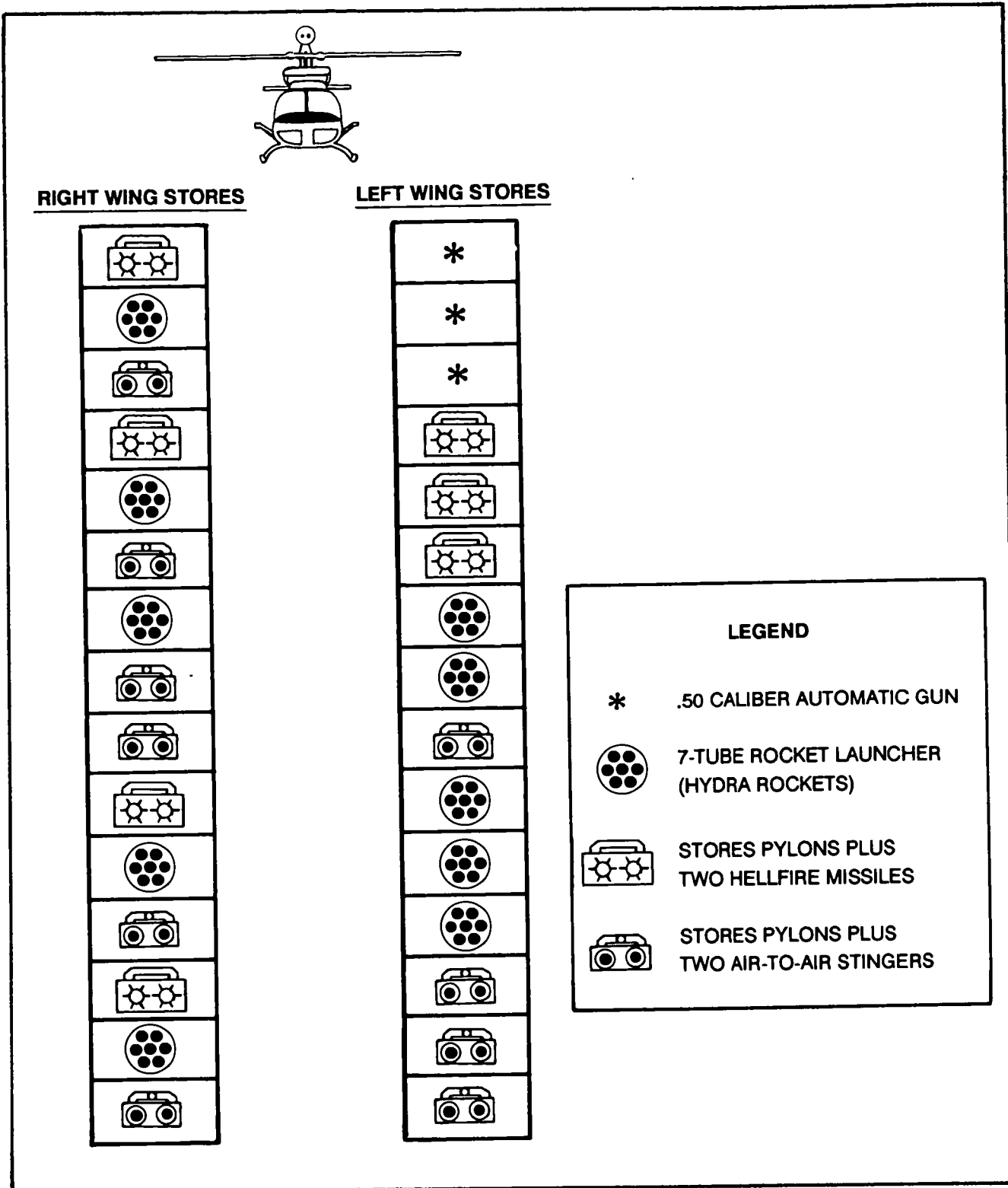


Figure G-4. OH-58D authorized armament configurations



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APPENDIX H

LEADERSHIP PLANNING SEQUENCE

The FARP mission requires that certain critical elements be considered during the planning, preparation, and execution phases of the operation. Figure H-1 outlines these elements.

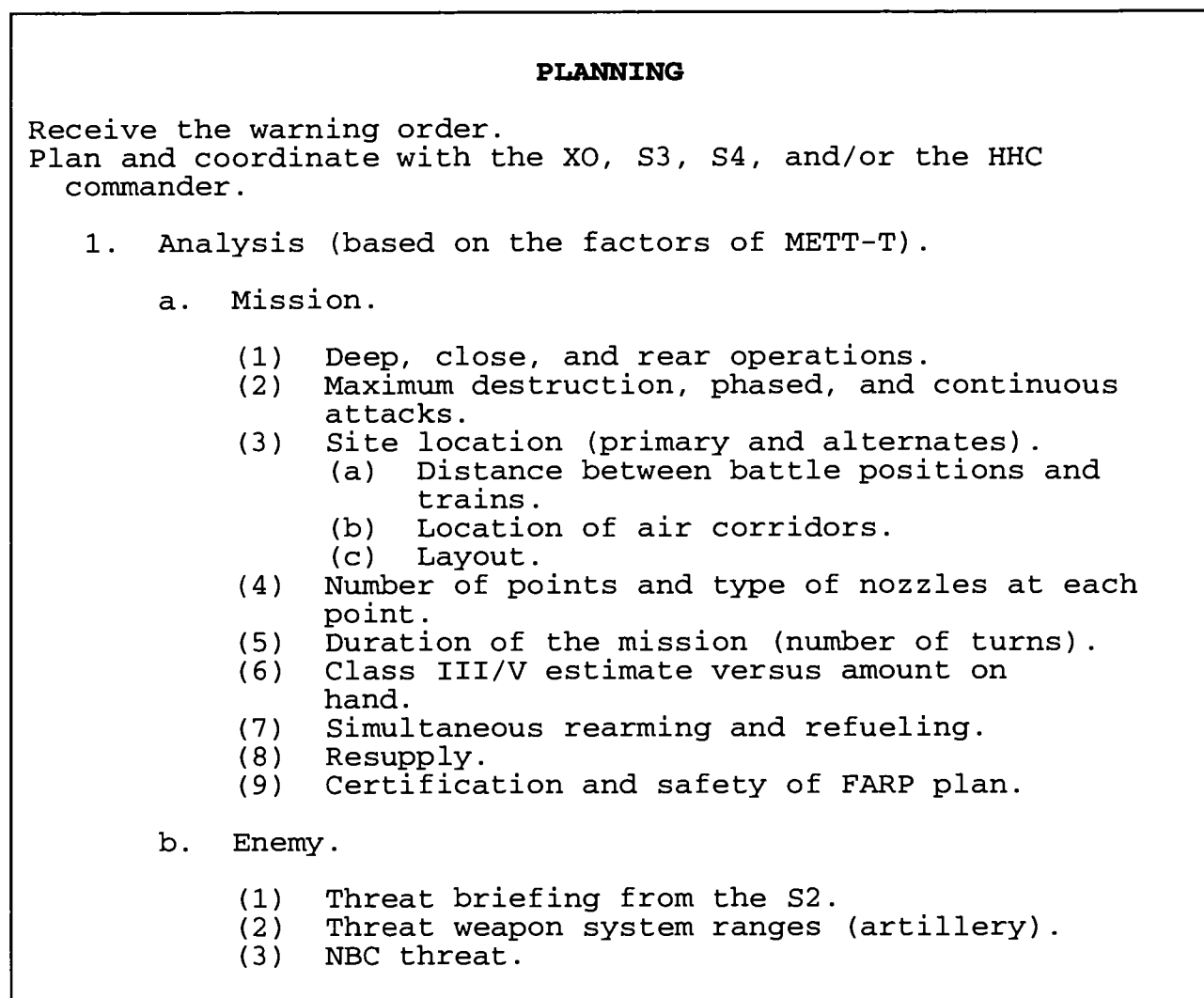


Figure H-1. Critical elements of the FARP planning sequence

- c. Terrain. (Use of terrain to hide aircraft and FARP signature.)
 - d. Troops. (Enough troops available to support the mission.)
 - e. Time Available. (Duration of mission versus security and Class III/V requirements.)
- 2. Emplacement Plan.
 - a. Air and Ground.
 - b. Resupply Route Clearance.
- 3. Movement Plan.
 - a. MSR Clearance.
 - b. Advance and/or Quartering Parties.
 - c. Movement of Assets (separate serials).
 - d. Convoy Briefing.
- 4. Security Plan.
 - a. ADA.
 - b. NBC (M8 alarms and so forth).
 - c. Perimeter.
- 5. Site Layout.
 - a. Sketch or Diagram.
 - b. Availability of FARP Site Layout to Personnel Before the Mission Begins.
 - c. Traffic Pattern and Pad Locations.
 - d. Type of Nozzles Used.
 - e. Radio Frequencies.
 - f. Designated Maintenance Area.
- 6. Command, Control, and Communications.
 - a. OIC (3/5 plt ldr, S4, XO, HHC cdr, or maint cdr).
 - b. Radios (primary and alternate frequencies).
 - c. Lost Communications Procedures.
 - d. Lighting.

Figure H-1. Critical elements of the FARP planning sequence (continued)

7. NBC Decontamination (Dirty FARP Plan).
 - a. Location (on graphics).
 - b. Pilot and Decontamination Team Awareness.
 - c. Signals.
8. Extraction and Displacement Plan.
 - a. Event-Driven (decision point based on enemy situation).
 - b. Communications (person who makes decision to move the FARP).
 - c. Subsequent Location.

PREPARATION

1. Troop-Leading Procedures (warning order, precombat inspection, rehearsal).
2. Site Preparation (FOD and police call).
3. Personnel (MOS-qualified 55Bs, 68Js, 77Bs, 91As, technical inspectors, and combat lifesavers).
4. Equipment.
 - a. Loaders and Downloaders (working and available).
 - b. Boresighting of the aircraft.
 - c. Loading of Class V on the aircraft.
5. Briefing for the Platoon and Noncommissioned Officers.
 - a. Mission.
 - b. Friendly Situation.
 - c. Enemy Situation.
 - d. Graphics on Maps.
6. Compliance With Standard Operating Procedures.

Figure H-1. Critical elements of the FARP planning sequence (continued)

EXECUTION

1. Planning Versus Reacting.
2. Enforcing FARP Turnaround Times.
3. Gathering and Compiling Class III/V Premission and Postmission Statistics.
4. Ensuring Safe Operations.

**Figure H-1. Critical elements of the FARP planning sequence
(continued)**

GLOSSARY

AAFARS	advanced aviation forward area refueling system
A/C	aircraft
acft	aircraft
AD	air defense
AGPU	aviation ground power unit
AH	attack helicopter
AL	Alabama
ALSE	aviation life support equipment
AM	amplitude modulated
AMC	air mission commander
ammo	ammunition
APU	auxiliary power unit
AR	Army regulation
ARTEP	Army Training and Evaluation Program
ASB	aviation support battalion
ASP	ammunition supply point
ATP	ammunition transfer point
ATS	air traffic services
ATTN	attention
aux	auxiliary
AVGAS	aviation gasoline
AVIM	aviation intermediate maintenance
AVUM	aviation unit maintenance
avn	aviation
bde	brigade
BLSA	basic load storage area
bn	battalion
BRRP	brigade (or battalion) rapid refueling point
BSA	brigade support area
C³	command, control, and communications
cav	cavalry
cbt	combat
CCR	closed-circuit refueling
cdr	commander
CE	crew chief
CG	center of gravity
CH	cargo helicopter
cl	class
cm	centimeter
CP	command post
CSA	corps support area

CTA	common table of allowances
CUCV	commercial utility cargo vehicle
DA	Department of the Army
DOD	Department of Defense
DOT	Department of Transportation
DRRP	division rapid refueling point
DSA	division support area
ea	each
ECAS	Enhanced Cobra/TOW Armament System
EOC	emergency operations center
EOM	end of mission
ERFS	extended range fuel system
FARE	forward area refueling equipment
FARP	forward arming and refueling point
FE	flight engineer
fld	field
FLOT	forward line of own troops
FM	field manual or frequency modulated
FMCP	fuel management control panel
FOD	foreign object damage
FRAGO	fragmentary order
FSO	fire support officer
ft	foot
fwd	forward
G2	Assistant Chief of Staff, G2 (Intelligence)
GCU	gas charging unit
GPH	gallons per hour
GPM	gallons per minute
grd	ground
GS	general support
GSE	ground support equipment
GTA	graphic training aid
HA	holding area
HARRP	helmet assembly, rearming refueling personnel
HE	high explosive
HEMAT	heavy expanded mobility ammunition trailer
HEMTT	heavy expanded mobility tactical truck
HF	Hellfire
HHC	headquarters and headquarters company
HMMWV	high mobility multipurpose wheeled vehicle
HQ	headquarters
HTARS	HEMTT tanker aviation refueling system
in	inch

JP	jet petroleum
JP4	jet petroleum, grade 4
km	kilometer(s)
kph	kilometers per hour
ldr	leader
LZ	landing zone
maint	maintenance
max	maximum
METT-T	mission, enemy, terrain, troops, and time available
MHE	materials handling equipment
mm	millimeter(s)
MOPP	mission-oriented protective posture
MOS	military occupational specialty
MSB	main support battalion
MTOE	modification table(s) of organization and equipment
MTP	mission training plan
NATO	North Atlantic Treaty Organization
NBC	nuclear, biological, chemical
NCO	noncommissioned officer
NCOIC	noncommissioned officer in charge
NDB	nondirectional radio beacon
NEW	net explosive weight
NOE	nap-of-the-earth
NSN	national stock number
NVD	night vision device
NVG	night vision goggles
OH	observation helicopter
OIC	officer in charge
OPORD	operation order
OPSEC	operations security
PC	pilot in command
plt	platoon
PMCS	preventive maintenance checks and services
POL	petroleum, oils and lubricants
ppm	parts per million
prod	production
psi	pounds per square inch
QSTAG	Quadripartite Standardization Agreement
RASA	ready ammunition storage area
S1	Adjutant (US Army)
S2	Intelligence Officer (US Army)

S3	Operations and Training Officer (US Army)
S4	Supply Officer (US Army)
SAM	send a message (visual communication system)
SB	supply bulletin
SMCT	soldier's manual of common tasks
SOP	standing operating procedure
spt	support
SRC	standard requirements code
STANAG	Standardization Agreement
std	standard
STP	soldier training publication
sys	system
tac	tactical
TC	training circular
TM	technical manual or team
TOC	tactical operations center
TOE	table(s) of organization and equipment
TOW	tube-launched, optically tracked, wire-guided
TPU	tank and pump unit
TRADOC	United States Army Training and Doctrine Command
UH	utility helicopter
UHF	ultrahigh frequency
US	United States (of America)
USAF	United States Air Force
VHF	very high frequency
XO	executive officer

REFERENCES

SOURCES USED

These are the sources quoted or paraphrased in this publication.

Army Regulations

- AR 200-1. Environmental Protection and Enhancement. 23 April 1990.
- AR 385-64. Ammunition and Explosives Safety Standards. 22 May 1987.
- AR 385-95. Army Aviation Accident Prevention. 20 May 1991.
- AR 500-60. Disaster Relief. 1 August 1981.

Army Training and Evaluation Program

- ARTEP 1-100-30-MTP. Mission Training Plan for the Headquarters and Headquarters Company Aviation Brigade and Battalion. 6 December 1991.

Department of the Army Forms

- DA Form 581. Request for Issue and Turn-in of Ammunition. August 1989.
- DA Form 2404. Equipment Inspection and Maintenance Worksheet. April 1979.
- DA Form 2408-13-1. Aircraft Inspection and Maintenance Record. October 1991.
- DA Form 2408-13-3. Aircraft Technical Inspection Worksheet. November 1991.

Field Manuals

- FM 1-100. Doctrinal Principles for Army Aviation in Combat Operations. 28 February 1989.
- FM 1-101. Aviation Battlefield Survivability. 5 December 1990.
- FM 1-109. Aviation Self-Deployment Planning. 29 May 1987.
- FM 1-111. Aviation Brigades. 27 August 1990.
- FM 5-100. Engineer Combat Operations. 22 November 1988.
- FM 8-10-6. Medical Evacuation in a Theater of Operations, Tactics, Techniques, and Procedures. 31 October 1991.
- FM 9-16. Explosive Ordnance Reconnaissance. 30 July 1981.
- FM 10-68. Aircraft Refueling. 29 May 1987.
- FM 10-69. Petroleum Supply Point Equipment and Operations. 22 October 1986.

FM 1-104

FM 10-70. Inspecting and Testing Petroleum Products. 9 May 1983.
FM 10-71. Petroleum Tank Vehicle Operations. 12 May 1978.
FM 20-3. Camouflage. 14 November 1990.
FM 21-11. First Aid for Soldiers. 27 October 1988.
FM 21-60. Visual Signals. 30 September 1987.
FM 44-8. Small Unit Self-Defense Against Air Attack. 30 December 1981.
FM 55-30. Army Motor Transport Units and Operations. 14 March 1980.
FM 55-450-3. Multiservice Helicopter External Air Transport: Basic Operations and Equipment. 11 February 1991.
FM 55-450-4. Multiservice Helicopter External Air Transport: Single Point Rigging Procedures. 11 February 1991.
FM 55-450-5. Multiservice Helicopter External Air Transport: Dual Point Load Rigging Procedures. 11 February 1991.
FM 71-100. Division Operations, 16 June 1990.
FM 100-5. Operations. 5 May 1986.
FM 100-2-1. Soviet Army Operations and Tactics. 16 July 1984.
FM 100-2-2. The Soviet Army Specialized Warfare and Rear Area Support. 16 July 1984.
FM 100-2-3. The Soviet Army Troops, Organization, and Equipment. 6 June 1991.
FM 101-10-1/1. Staff Officers Field Manual - Organizational, Technical and Logistical Data (Volume 1). 7 October 1987.
FM 101-10-1/2. Staff Officers Field Manual - Organizational, Technical, and Logistical Data, Planning Factors (Volume 2). 7 October 1987.

International Standardization Agreements

QSTAG 691 (Edition Two) and AIR STD 44/31C. Helicopter Tactical Refueling. March 1991.
QSTAG 703 (Edition One). Tactical Approach and Departure at Field Sites. January 1993.
STANAG 2946 (Edition One). Forward Area Refueling Equipment. July 1983.
STANAG 2999 (Edition One). Use of Helicopters in Land Operations. April 1992.
STANAG 3117 (Edition Five) and AIR STD 44/42A. Aircraft Marshalling Signals. October 1985.

Supply Bulletin

SB 710-2. Supply Control Combat Consumption Rates for Ground and Aviation-Type Petroleum Products. 12 March 1993.

Technical Manuals

- TM 9-1300-206. Ammunition and Explosives Standards. 30 August 1973.
- TM 9-1340-222-20. Organizational Maintenance Manual (Including Repair Parts and Special Tools List) 2.75-Inch Low Spin, Folding Fin Aircraft Rockets: 66-MM, Light Antitank Weapon Systems: 3.5-Inch Rockets and M3A2E1 Rocket Mortar (JATO). 13 June 1973.
- TM 55-1520-236-10. Operator's Manual for Army Model AH-1P (PROD), AH-1E (ECAS), and AH-1F (Modernized Cobra) Helicopters. 11 January 1980.
- TM 55-1520-240-10. Operator's Manual for Army CH-47D Helicopters. 30 April 1992.
- TM 55-1560-307-13&P. Operator, Aviation Unit and Aviation Intermediate Maintenance Manual With Repair Parts and Special Tools List for Extended Range Fuel System Army Model CH-47 Helicopter. 11 December 1990.
- TM 750-244-3. Procedures for Destruction of Equipment to Prevent Enemy Use. 23 September 1969.

DOCUMENTS NEEDED

This document must be available to the intended users of this publication.

DA Form 2028. Recommended Changes to Publications and Blank Forms. February 1974.

READINGS RECOMMENDED

These readings contain relevant supplemental information.

- AR 385-64. Ammunition and Explosives Safety Standards. 22 May 1987.
- FM 9-13. Ammunition Handbook. 4 November 1986.



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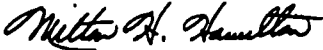
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FM 1-104
12 SEPTEMBER 94

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